

IEEE Computational Intelligence Society Roots: 1986-1996

Robert J. Marks II

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Introduction

The *IEEE Computational Intelligence Society* (CIS) had its genesis in 1987 as the *IEEE Neural Networks Committee* (NNCom). In 1990, the organization was promoted to the *IEEE Neural Networks Council* (NNC) and then in 1990, to the *IEEE Neural Networks Society*. The name was changed to the IEEE Computational Intelligence Society in 2003. Herein is a chronological documentation of some of the people and important events that formed the CIS during its first decade.¹ During this period, the following premiered:

■ Periodical Publications

- ▶ The IEEE TRANSACTIONS ON NEURAL NETWORKS,
- ▶ IEEE TRANSACTIONS ON FUZZY SYSTEMS, and
- ▶ The CONNECTIONS Newsletter.

■ Conference series.

- ▶ The IEEE International Conference on Neural Networks (ICNN)
- ▶ The IEEE/INNS International Joint Conference on Neural Networks (IJCNN),
- ▶ The IEEE International Conference on Fuzzy Systems (FUZZ-IEEE),
- ▶ The IEEE Conference on Evolutionary Computing (ICEC),
- ▶ Computational Intelligence for Financial Engineering (CIFEr),
- ▶ The IEEE World Congresses on Computational Intelligence (WCCI), and
- ▶ The Virtual Reality Annual International Symposium (VRAIS).²

■ Regional Interest Groups³ (RIGS),

¹ The pictures in this document are from the private collection of Robert J. Marks II.

²The conference was ultimately absorbed into the IEEE Computer Engineering Society.

³These are now chapters of the IEEE CIS.

■ Awards

- ▶ CIS IEEE Fellows,
- ▶ the Neural Networks Pioneer Award,
- ▶ the Fuzzy Pioneer Award,
- ▶ the IEEE TNN Best Paper, and
- ▶ the IEEE TFS Best Paper.

■ Other accomplishments include

- ▶ Initiating a Distinguished Lecturer Program,
- ▶ Establishing a thriving relationship with IEEE Press for sponsored books,
- ▶ Proposing of the IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTING,
- ▶ Being the first IEEE Society/Council to offer conference proceedings on CD ROM,
- ▶ Having international conferences in Japan, China and Russia,
- ▶ Being among the first of the IEEE Societies/Councils to establish a presence on the web, and
- ▶ Offering the best selling video series in the history of the IEEE Educational Activities Board.

And, in 1994, the term *computational intelligence* was first applied as an umbrella term for fields including neural networks, fuzzy systems and evolutionary computing.

1 1986

A flourish of interest in artificial neural networks blossomed in the late 1980's, largely due to John Hopfield (Cal Tech) [14, 15, 43]. His works with D.W. Tank [15, 43] in 1986, in particular, showed how analog circuitry could perform neural type operations. Their work was published in the IEEE TRANSACTIONS ON CIRCUITS AND SYSTEMS [43]. Hopfield's influential papers were subsequently referenced by over 6600 journal articles [16]. Also in 1986, another highly influential work demonstrating error back propagation training of multilayered perceptrons was published by David Rumelhart *et al.* [36]. The training algorithm is still in common use.⁴

The interest in neural networks swelled in the engineering and computer science communities. A key by-invitation-only conference dedicated to neural networks in Snowbird, Utah was attended by the top researchers in the field [7].

⁴A more comprehensive history of neural network research in engineering and computer science dating from McCullough-Pitts to the work of Widrow and Rosenblatt and beyond is given by Eberhart [8].

1987

Robert Hecht-Nielson, then at TRW,⁵ and Bart Kosko, currently Professor of Electrical Engineering at USC, recognize the need for an open IEEE Conference dedicated to neural networks. They approach the San Diego section of the IEEE who agrees to sponsor the first *IEEE International Conference on Neural Networks* (ICNN). The conference venue is the Town & Country Hotel in San Diego. IEEE Sections, however, are not permitted by IEEE to sponsor international conferences. The event comes to the attention of the *IEEE Technical Activities Board* (TAB) who, to legitimize the conference, forms the *IEEE Neural Networks Committee* (NNCom). In IEEE, a *Committee*, whose members are IEEE Societies, shares a common technical interest and has the ability to sponsor international conferences.

■ The charter members of the IEEE NNCom are

- ▶ Circuits and Systems Society
- ▶ Communications Society
- ▶ Control Theory Society
- ▶ Engineering in Medicine and Biology Society
- ▶ Industrial Electronics Society
- ▶ Information Theory Society
- ▶ Laser and Electro-Optics Society (LEOS)
- ▶ Robotics and Automation Society
- ▶ Signal Processing⁶
- ▶ Systems, Man and Cybernetics

■ On June 21-24, 1987 *The First IEEE ICNN* is held in San Diego.

- ▶ Conference Committee
 - Teuvo Kohonen (Helsinki University of Technology) serves as the International Chair,
 - Stephen Grossberg (Boston University) is the Conference Chair, and
 - Bart Kosko is the Chair of the Program Committee.

■ At the ICNN, the following NNCom officers.

- ▶ H. Troy Nagle (NC State) is elected the first Chair,

⁵Robert Hecht-Nielson later co-founded Hecht-Nielson Corporation (HNC) Software, whose activities included transaction monitoring (*e.g.* credit card purchases) using neural networks. HNC Software was later acquired by Fair Isaac Corporation where Hecht-Nielson currently serves as VP of Research. He is also an Adjunct Professor at UC San Diego.

⁶In 1987, the Signal Processing Society was named the *IEEE Acoustics, Speech and Signal Processing Society*.

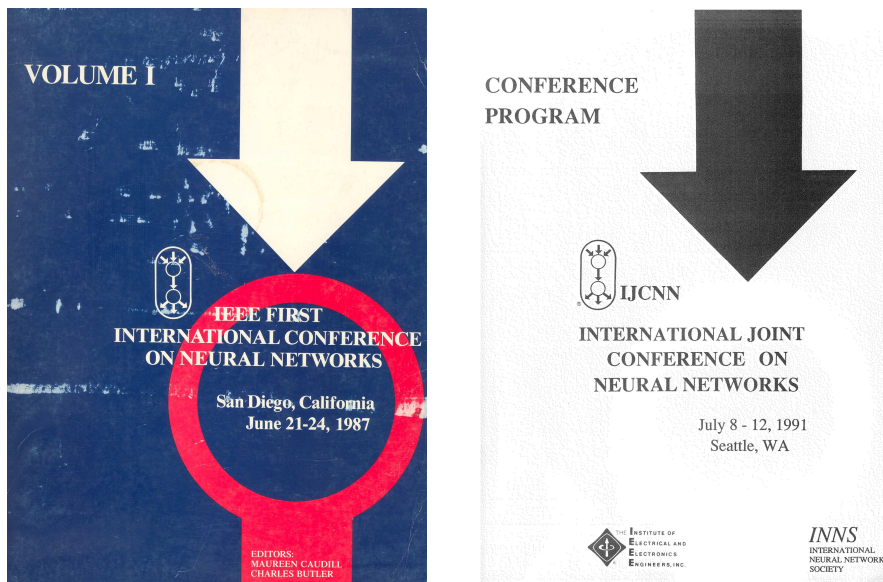


Figure 1: LEFT: The first ICNN in 1987. RIGHT: Seattle IJCNN 1991, Program Cover.

- ▶ Wesley E. Snyder (NC State) is elected Treasurer, and
- ▶ Robert J. Marks II (University of Washington and now at Baylor University) is elected Secretary.
- The *International Neural Network Society* (INNS) is also organized at the first ICNN. Stephen Grossberg (Boston University) serves as the first President.

1988

- July 24-27, 1988: The Second IEEE ICNN is held in San Diego. Robert Hecht-Nielson is the Organizing Chair.
- November 28: The NNCom Administrative Committee (AdCom) holds its meeting in Denver. Troy Nagle appoints a committee to propose the IEEE TRANSACTIONS ON NEURAL NETWORKS. The members are
 - ▶ Herb Rauch (Lockheed),
 - ▶ Robert Newcomb (University of Maryland),
 - ▶ Evangelia Tzanakou (Rutgers), and
 - ▶ Robert J. Marks, Chair.

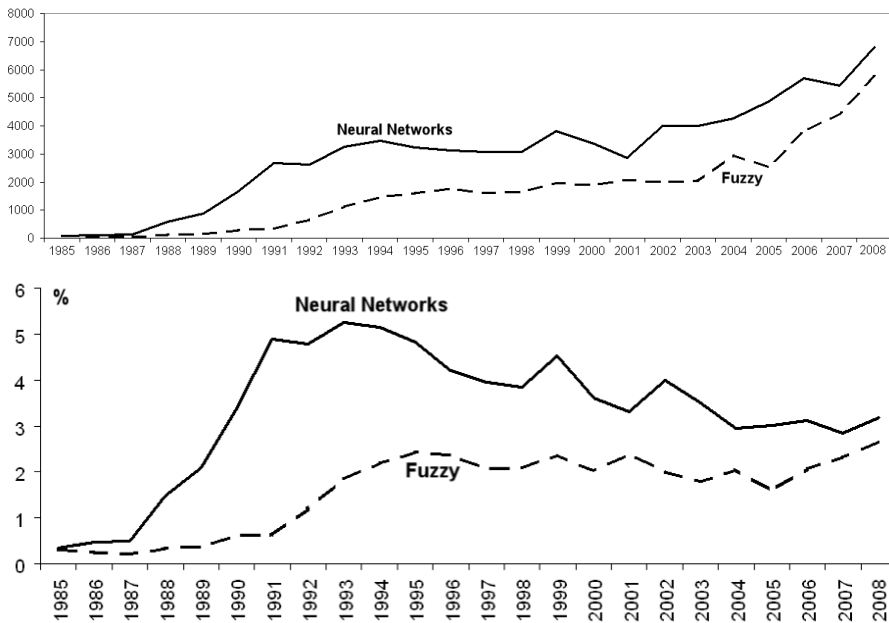


Figure 2: TOP: IEEE publications in neural networks and fuzzy systems. Source: IEEE Xplore using keyword searches \sim neural ne* and \sim fuz* where \sim * denotes a wild card. BOTTOM: The data in to Figure expressed as the percent of all IEEE papers. IEEE publications increased by almost a factor of 10 from 23,260 in 1985 to 214,117 in 2008.

- Troy Nagle is elected TAB Vice President. The TAB VP is not allowed to hold an officer position in any other IEEE Organization. He resigns his Chair position on the NNCom. Robert J. Marks becomes Chairman *pro tem*.
- As is shown in Figure 2, the number of IEEE papers in 1988 dedicated to neural networks exceeds the sum of the papers for the preceding three years.
- Darpa publishes its neural network study [5].

1989

- January 1: The IEEE NNCom and the *International Neural Network Society* (INNS) agree to combine the ICNN and INNS Annual Meeting into the *International Joint Conference on Neural Networks* (IJCNN).

- Feb 15: The IEEE Publications Committee approves the IEEE NNCom's proposal for the IEEE TRANSACTIONS ON NEURAL NETWORKS.
- On June 18-21, the first IJCNN is held in Washington DC.
 - ▶ Conference Committee
 - Allen Stubberud (UC Irvine) and Wesley E. Snyder (NC State) are the Steering Committee Chairs, and
 - Robert Hecht-Nielsen is the Program Chair.
- June 18: At the NNCom AdCom in Washington DC,
 - ▶ AdCom approves a draft of the constitution for the new IEEE Neural Networks Council (NNC),⁷
 - ▶ Elections are held for the NNCom for the calendar year 1990. The results are
 - R. J. Marks II, Chairman
 - Evangelia Tzanakou, (Rutgers University) Secretary
 - Russel C. Eberhart, (Johns Hopkins University, now at IUPUI) Treasurer
- September: Fuzzy systems begin to attract media attention. Excerpts from an article in Time Magazine [12] where “fuzzy thinking” is called “oddball.”
- The IEEE Technical Activities Board (TAB) approves formation of the IEEE NNC beginning on January 1st, 1990.
- November 26: The NNCom holds its AdCom Meeting in Denver.
 - ▶ The NNCom initiates trademarking the NNC logo⁸ (Figure 4), and
 - ▶ The IEEE Industry Applications Society and the IEEE Oceanic Engineering Society join the NNC.

1990

- January 1: The IEEE Neural Networks Committee becomes the IEEE Neural Networks Council (NNC). The NNC field of interest:

“consists of the aspects of the theory, design, and applications of neural networks that range from software to hardware.”

⁷IEEE Committees typically either sponsor meetings or publish transactions. Councils can do both. They also have a vote on the IEEE Technical Activities Board and, unlike IEEE Committees, can endorse IEEE Fellows.

⁸The logo was created for the first ICNN in 1987.

Technology

Time for Some Fuzzy Thinking

An oddball approach to computer science pays off in Japan

BY PHILIP ELMER-DEWITT

In the pages of *Books in Print*, listed among works like *Fuzzy Bear* and *Fuzzy Wuzzy Puppy*, are some strange-sounding titles: *Fuzzy Systems*, *Fuzzy Set Theory* and *Fuzzy Reasoning & Its Applications*. The bedtime reading of scientists gone soft in the head? No, these academic tomes are the collected output of 25 years of mostly American research in fuzzy logic, a branch of mathematics designed to help computers simulate the various kinds of vagueness and uncertainty found in everyday life. Despite a distinguished corps of devoted followers, however, fuzzy logic has been largely relegated to the back shelves of computer science—at least in the U.S.

But not, it turns out, in Japan. As they have so often in the past, the Japanese have seized on an American invention and found practical uses for it. Suddenly the term fuzzy and products based on principles of fuzzy logic seem to be everywhere in Japan: in television documentaries, in corporate magazine ads and in novel electronic gadgets ranging from computer-controlled air conditioners to golf-swing analyzers. The concept of fuzziness has struck a cultural chord in a society whose religions and philosophies are attuned to ambiguity and contradiction. Says Noboru Wakami, a senior researcher at Matsushita: "It's like soy sauce and sushi—a perfect match."

What is fuzzy logic? The original concept, developed in the mid-'60s by Lofti Zadeh, a Russian-born professor of computer science at the University of California, Berkeley, is that things in the real world do not fall into the neat, crisp categories defined by traditional set theory, like the set of even numbers or the set of left-handed baseball players. In standard Aristotelian logic, as in computer science, membership in a class or set is not a matter of degree. Either a number is even, or it is not. But this on-or-off, black-or-white, 0-or-1 approach falls apart when applied to many everyday classifications, like the set of beautiful women, the set of tall men or the set of very cold days.

To deal with such cases, Zadeh proposed that membership in a set be measured not as a 0 or a 1, but as a value between 0 and 1. Thus, in the set of tall men, George Bush (6 ft. 2 in.) might have a

membership value of 0.7, while Kareem Abdul-Jabbar (7 ft. 2 in.) might have a 0.99. Zadeh and his students went on to elaborate a full fuzzy mathematics, devising precise rules for combining vague expressions like "somewhat fast," "very hot" and "usually wrong."

This mathematics turns out to be surprisingly useful for controlling robots, machine tools and various electronic systems. A conventional air conditioner, for example, recognizes only two basic states: too hot or too cold. When geared for thermostat control, the cooling system either

operates at full blast or shuts off completely. A fuzzy air conditioner, by contrast, would recognize that some room temperatures are closer to the human comfort zone than others. Its cooling system would begin to slow down gradually as the room temperature approached the desired setting. Result: a more comfortable room and a smaller electric bill.

Fuzzy logic began to find applications in industry in the early '70s, when it was teamed with another form of advanced computer science called the expert system. A product of research into artificial intelligence, expert systems solve complex problems somewhat like human experts do—by applying rules of thumb. (Example: when the oven gets very hot, turn the gas down a bit.) In 1980 F.L. Smidth & Co. of Copenhagen began marketing the first commercial fuzzy expert system: a computer program that controlled the fuel-intake rate and gas flow of a rotating kiln used to make cement.

TIME, SEPTEMBER 25, 1989

Figure 3: A September 1989 article from Time Magazine calls fuzzy logic "oddball".

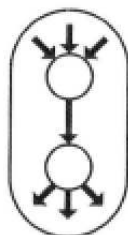


Figure 4: The IEEE NNC logo. A Trademark was issued in 1993. (See Figure 38 on page 44.)

- January 16: NNC AdCom Meeting.
 - ▶ The NNC Fellows Committee is appointed. Edward Posner (Cal Tech) is the first Chair.
 - ▶ The NNC Standards Committee is appointed. Evangelia Tzanakou is the first Chair.
 - ▶ Election of the first officers of the IEEE Neural Networks Council (NNC) is held.
 - R. J. Marks II, President
 - R. Eberhart, Vice President
 - E. Tzanakou, (Rutgers University) Secretary
 - Toshio Fukuda, (Nagoya University) Treasurer
- March 1990: THE IEEE TRANSACTIONS ON NEURAL NETWORKS (TNN) debuts. Herb Rauch at Lockheed is the first Editor-in-Chief. Thirty five full papers are submitted for the first issue. Ten are published. (See Figure 5.) The TNN is initially issued quarterly.
- June 17-21: The IJCNN is held in San Diego. (See Figures 6 and 7.)
 - ▶ Conference Committee
 - The Chairs are Walter J. Karplus (UCLA) and Joseph W. Goodman (Stanford University).
 - The program Chairs are Walter Freeman (UC Berkeley) and Bart Kosko (USC).
- June 19: The NNC holds its AdCom Meeting in San Diego.
 - ▶ Each member society of the NNC is given \$2000 from the NNC surplus.
 - ▶ The 1991 NNC officers are elected.

Editorial

The Inauguration of a New Publication



WE welcome you to the first issue of the IEEE TRANSACTIONS ON NEURAL NETWORKS, an archival publication devoted to the science and technology of neural networks. Interest in neural networks is going through explosive growth; we anticipate that this TRANSACTIONS will serve this growth by providing readers with the latest information and by providing authors with rapid publication.

This TRANSACTIONS will publish high-quality papers on the theory, design, and application of neural networks, ranging from software to hardware. Emphasis will be given to artificial neural networks. Readers are encouraged to submit manuscripts which disclose significant technical achievements, indicate exploratory developments, or present significant applications for neural networks. This TRANSACTIONS also contains a Letters section intended to serve as a vehicle for rapid publication of short correspondence concerning new research results. Prospective authors should consult Information for Authors on the inside back cover.

This first issue contains a section called Scanning the Issue which gives the reader a quick introduction to the papers contained in the issue. This year this TRANSACTIONS will be published quarterly (four issues). It is anticipated that in 1991, this TRANSACTIONS will go to bi-monthly publication (six issues) with a corresponding increase in pages.

Neural Networks Council

This TRANSACTIONS is published under the sponsorship of the IEEE Neural Networks Council, an organization within the framework of the IEEE. The IEEE Neural Networks Council is composed of the following ten IEEE societies, which reflect the wide range of disciplines within its scope:

- Circuits and Systems;
- Communications;
- Control Systems;
- Engineering in Medicine and Biology;
- Industrial Electronics;
- Information Theory;
- Lasers and Electro-Optics;
- Robotics and Automation;
- Signal Processing; and
- Systems, Man, and Cybernetics.

The IEEE Neural Networks Council also sponsors conferences, and in 1990 it cosponsors two International Joint Conferences on Neural Networks (IJCNN), one held January 15-19, 1990, in Washington, DC, and one to be held June 17-21, 1990, in San Diego, CA.

Appreciation

The creation of a new publication is an immense undertaking, and we thank the many people who have made it possible. In particular, Bob Marks, President of the IEEE Neural Networks Council, has provided valuable leadership and steady support. The members of the Executive Advisory Board of this TRANSACTIONS (Shun-Ichi Amari, Leon Cooper, Robert Hecht-Nielsen, John Hopfield, Teuvo Kohonen, Carver Mead, and Bernard Widrow) have provided much needed advice during the initial stages. For this first issue the Associate Editors and the reviewers have done an excellent job under a tight time schedule. We thank them and the authors. We hope that you, the readers, appreciate our efforts in this new endeavor.

HERBERT E. RAUCH
Editor

Figure 5: Herb Rauch's editorial on the launching of the IEEE TRANSACTIONS ON NEURAL NETWORKS [35].

International Joint Conference on Neural Networks

San Diego, California • June 17 - 21, 1990

The 1990 International Joint Conference on Neural Networks (IJCNN) is sponsored by the IEEE Council on Neural Networks and the International Neural Network Society (INNS). The IJCNN will cover the full spectrum of neural computing from theory such as neurodynamics to applications such as machine vision. Meet leading experts and practitioners during the largest conference in the field. For further information contact Nomi Feldman, Meeting Management, 5665 Oberlin Dr., Suite 110, San Diego CA 92121. Telephone (619) 453-6222.

Schedule of Events

Sunday, June 17	TUTORIALS (8 a.m. - 6 p.m.) RECEPTION (6 p.m. - 8 p.m.) INDUSTRY PANEL (8 p.m. - 10 p.m.)
Monday, June 18	TECHNICAL SESSIONS (8 a.m. - 5 p.m.) <i>Applications I, Invertebrate Neural Networks, Applications II, Image Processing</i> BIOENGINEERING PANEL (12 p.m. - 1:30 p.m.) PLENARY SESSION(S) (8 p.m. - 10 p.m.)
Tuesday, June 19	TECHNICAL SESSIONS (8 a.m. - 5 p.m.) <i>Supervised Learning, Associative Memory, Unsupervised Learning, Sensation and Perception</i> PLENARY SESSION(S) (8 p.m. - 10 p.m.)
Wednesday, June 20	TECHNICAL SESSIONS (8 a.m. - 5 p.m.) <i>Electrical Neurocomputers, Sensorimotor Control Systems, Optical Neurocomputers, Machine Vision</i> PARTY (6 p.m. - 8 p.m.) GOVERNMENT PANEL (8 p.m. - 10 p.m.)
Thursday, June 21	TECHNICAL SESSIONS (8 a.m. - 5 p.m.) <i>Robotics and Control, Neuro-Dynamics, Neurocognition, Optimization</i>

Tutorials

Thirteen tutorials are planned for Sunday, June 17. Following are the presenters and their topics:

Adaptive Sensory-Motor Control - Stephen Grossberg, Boston University, *Associative Memory* - Bart Kosko, University of Southern California, *Chaos for Engineers* - Leon Chua, UC Berkeley, *Dynamical Systems Review* - Morris Hirsch, UC Berkeley, *LMS Techniques in Neural Networks* - Bernard Widrow, Stanford University, *Neural Network Applications* - Robert Hecht-Nielsen, HNC, *Neurobiology I: Neurons and Simple Networks* - Walter Freeman, UC Berkeley, *Neurobiology II: Advanced Networks* - Allen Selverston, UC San Diego, *Optical Neurocomputers* - Demetri Psaltis, CalTech, *Reinforcement Learning* - Andrew Barto, University of Massachusetts, Amherst, *Self-Organizing Feature Maps* - Teuvo Kohonen, Helsinki University, *Vision* - John Daugman, Harvard University, *VLSI Technology and Neural Network Chips* - Lawrence Jackel, Bell Laboratories

Tutorials are \$125 each or four for \$450. Registration is on a first-come, first-served basis, and early registration is strongly advised. Only registered conference participants may register for tutorials.

Exhibits

Exhibitors will present innovations in neural networks, including neurocomputers, VLSI neural networks, implementations, software systems and applications. IJCNN is the neural network industry's largest tradeshow. Vendors may contact Richard Rea at (619) 222-7447 for additional information.

Accommodations

The IJCNN location is at San Diego Marriott Hotel and Marina, on the San Diego Bay. Special room rates are offered to conference participants. A limited number of rooms are being held for the group until May 15, 1990. For more information, please call the San Diego Marriott Hotel and Marina at (619) 234-1500.

Registration

The conference registration fee includes admission to all sessions, exhibit area, Sunday Welcome Reception and Wednesday Party. TUTORIALS ARE NOT INCLUDED. There is a substantial savings realized for early registration. Before April 15, 1990, the price is \$240, and registration after April 15 is \$280. A single-day rate, proceedings not included, is available for \$110. Full-time students may attend for \$50, proceedings and Wednesday Party not included.

Figure 6: 1990 San Diego IJCNN CFP.



Figure 7: 1990 San Diego IJCNN publicity.

- R. J. Marks II, President⁹
 - R. Eberhart, Vice President
 - E. Tzanakou, Secretary
 - Patrick K. Simpson (ORINCON), Treasurer
- ▶ NNC AdCom approves the NNC/INNS Agreement for sponsoring IJCNN's.
 - ▶ The NNC Pioneer Award and the TNN Best Paper Award are approved. Brad Dickinson (Princeton) is the first NNC Awards Committee Chair.

1991

- Neural networks make their way into the popular media, *e.g.* the *Dick Tracy* comic strip shown in Figure 8.
- IEEE TRANSACTIONS ON NEURAL NETWORKS
 - ▶ Michael W. Roth (Johns Hopkins) is appointed the second TNN Editor-in-Chief.
 - ▶ TNN submissions increase 200%.

⁹The NNC Constitution allowed the President to serve, at most, two years.

DICK TRACY

Dick Locher and Max Collins

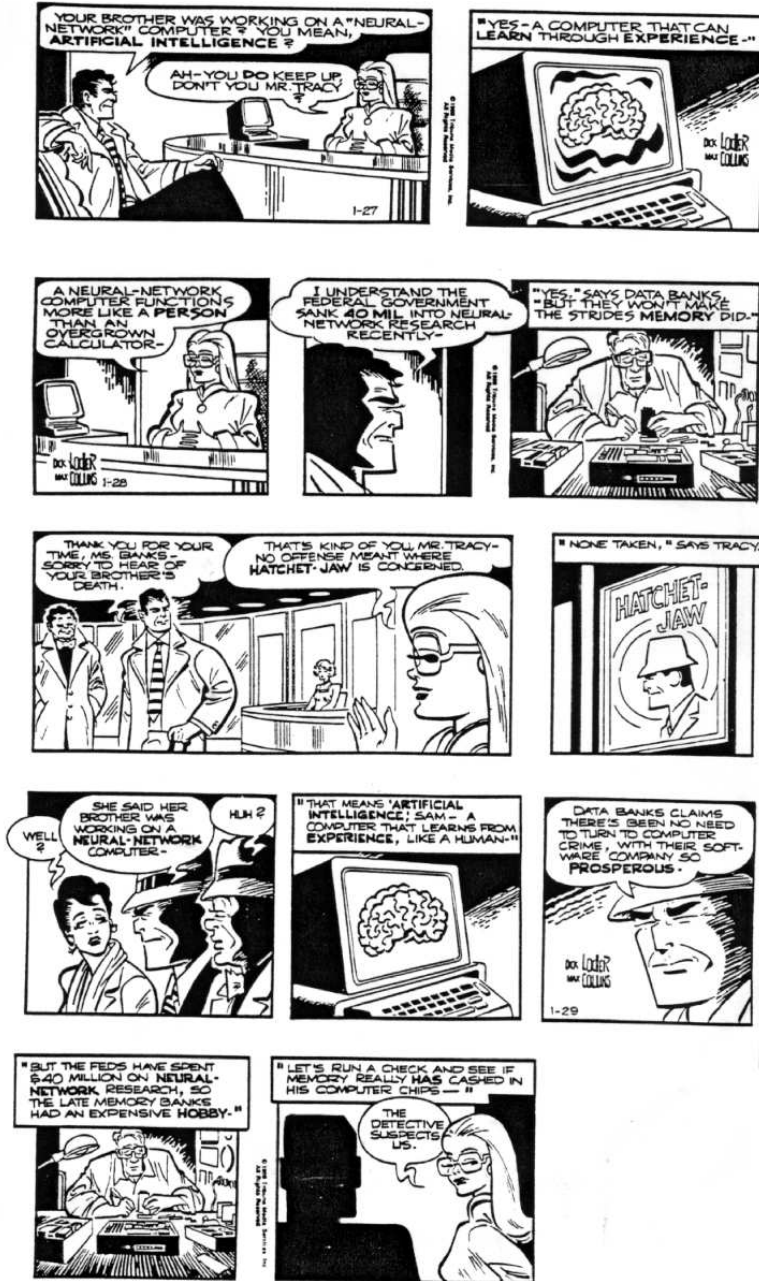


Figure 8: *Dick Tracy* was a syndicated newspaper cartoon strip that premiered on October 4, 1931. “Dick” became an American slang for detective. This strip ran on January 29, 1991.

IEEE Distinguished Lecturers Program

The Neural Networks Council and other societies and councils are assisting the IEEE in compiling a list outstanding speakers in various fields. For more information about the program, contact the Program Chair: Don Wunsch (206) 477-5073, (206) 477-1001 FAX, wunsch@atc.boeing.com. The following are the selected participants and their areas of expertise for the IEEE Neural Networks Council Distinguished Lecturer Program:

<p>•Prof. Jim Bezdek (USA) (904) 474-2784 (904) 474-3129 FAX jbezdek@uwf.bitnet Neural Networks, Pattern Recognition, and Intelligence; Neural Networks and Fuzzy Logic; Fuzzy Logic, Pattern Recognition and Control</p>	<p>49 211 311-3085 FAX eckmille@dd0rnd81.bitnet Neural Networks for Motor Control in Primates and Robots; Neural Networks for Control, Prediction and Forecasting Chaotic Systems; Towards Stable International Cooperation in the Field of New Information Processing Technology</p>	<p>Handwriting With Selective Attention</p>	<p>marks@ee.u.washington.edu Query-Based Learning Heisenberg's Fuzzy Principle</p>	<p>History and Prospects of Neural Networks</p>
<p>•Prof. John Caulfield (USA) (205) 895-6030 (205) 895-6618 FAX Optical Neural Networks; Massive Neural Networks</p>	<p>•Kunihiko Fukushima (Japan) 81-6-843-0747 81-6-843-9354 FAX Neocognitron and Selective Attention Model for Visual Pattern Recognition; Visual Pattern Recognition With Neural Networks; Recognition and Segmentation of Characters in Cursive</p>	<p>•Prof. Stephen Grossberg (USA) (617) 353-7857 (617) 353-8100 FAX Supervised Learning, Recognition and Prediction by Self-Organizing Neural Networks; Neural Networks for Vision and Image Processing; Neural Networks for Adaptive Sensory Motor Control; Neural Networks for Temporal Learning With Application to Speech Recognition</p>	<p>•Prof. Andras J. Pellionisz (USA) (415) 604-4821 pellioni@pioneer.arc.nasa.gov Geometry of Brain Function, Sensory Motor Transformations by Neural Networks, Tensor Network Theory of the Central Nervous System</p>	<p>•Prof. Youshou Wu (PR China) 86-1-2567733-5063 86-1-2564176 FAX Recent Advances in Neural Network Research in China, The Application of Neural Networks in Chinese Character Recognition</p>
<p>•Prof. Dr.-Ing. Rolf Eckmiller (Germany) 49 211 311-4540</p>		<p>•Prof. Robert J. Marks II (USA) (206) 543-6990 (206) 543-3842 FAX</p>	<p>•Dr. Paul J. Werbos (USA) (202) 357-9618 (202) 357-9408 FAX pwerbos@note.nsf.gov Intelligent Control; Neural Networks for System Identification; Backpropagation,</p>	<p>•Prof. Lotfi Zadeh (USA) (510) 642-4959 (510) 642-5775 FAX zadeh@cs.berkeley.edu Fuzzy Logic: Principles, Applications and Perspectives; The Calculus of Fuzzy If-Then Rules</p>

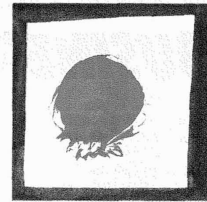
Figure 9: The debut of the NNC's Distinguished Lecturer Program [6].

- ▶ Pages in the TNN are increased from 340 to 640. The TNN is still issued quarterly.
- IEEE NNC Distinguished Lecture Program is initiated. Donald C. Wunsch (Boeing Computer Services and now with the Missouri University of Science and Technology) is the Chair (See Figure 9). The first Distinguished Lecturers are:
 - ▶ James C. Bezdek, (University of Western Florida)
 - ▶ John Caulfield, (University of Huntsville, Alabama)
 - ▶ Rolf Eckmiller, (Universität Bonn, Germany)
 - ▶ Kunihiko Fukushima, (Osaka University, Japan)
 - ▶ Stephen Grossberg
 - ▶ Robert J. Marks II
 - ▶ Andrew J. Pellionisz, (New York University Medical Center)
 - ▶ Paul Werbos, (National Science Foundation)
 - ▶ Youshou Wu, (Tsinghua University, China)
 - ▶ Lotfi Zadeh, (UC Berkeley)
- January 1991: In their review of technology the IEEE Spectrum, for the first time, writes about the NNC [17]. (See Figure 10.)
- January 26: The NNC AdCom Meeting is held in Baltimore.

TECHNOLOGY 1991

THE SPECIALTIES

Neural networks proposed for diverse applications
A decision-technology concept improves budgeting
Curriculum revision gets high priority in education
Better interchange of integrated documents needed



Neural networks are slow to learn... cybernetics can boost competitiveness... the future engineer's education must encompass more topics in a more cohesive manner... the ability to transfer documents integrating test and graphics among different software packages needs developing. These comments on some of the more specialized branches of electrical engineering come from reports given to us by spokesmen from the IEEE Council on Neural Networks, the IEEE Systems, Man, and Cybernetics Society, the IEEE Education Society, and the IEEE Professional Communication Society.

Artificial neural networks remain the most exciting topic in the field of computational sciences, maintained Robert J. Marks II, president of the IEEE Council on Neural Networks. Meanwhile, however, they "are still seeking an application identity," he said. "Currently, the bulk of interest is being focused on artificial neural networks as classification and regression machines trained by example. Such networks have been proposed and preliminarily applied in fields as diverse as electric power load forecasting, medical diagnosis, mortgage brokering, explosives detection, speech recognition, remote sensing, and racehorse handicapping." The short-term success of the networks will be determined by their performance relative to other cutting-edge techniques and to more conventional approaches, he said, adding that in recent studies "in most cases, the artificial neural network has performed quite well."

But although the "modular and parallel structure and, in some cases, the highly fault-tolerant characteristics of artificial neural network architectures remain quite attractive," Marks cited some problems. "The most widely used artificial neural networks, for example, don't scale well. They typically yield a diminishing performance return as the size of the net grows," he observed. "Possible solutions include modularization or a more general algorithmic breakthrough." As for their current use as classification and regression machines, he pointed up significant training problems. "Current popular training procedures, for example, remain painfully slow and many require floating-point precision, prohibiting analog implementation," he said.

Better budgeting with TAPS

Madan G. Singh, vice president for publications, IEEE Society on Systems, Man, and Cybernetics, told us that a number of recent decision technology concepts and products are being used to enhance companies' competitiveness.

One example Singh told us about is Targeting and Allocation of Promotional Spend (TAPS). It brings together ideas from systems engineering, computer science, cognitive science, marketing, and mathematics, to produce a practical computer-based aid to budget allocation. Singh gave us this further explanation:

"TAPS follows a three-stage process. In stage 1, the judgments of a group of managers in response to a series of 'what if' expenditure scenarios generated by TAPS are captured. In stage 2, the expert knowledge base is used with mathematical optimization routines within TAPS to build up individual campaign models and a model of the total budget allocation across all cam-

Ronald K. Jurgens Senior Editor

paigns. Stage 3 is one of exploration, which can provide answers to such questions as: how can sales be increased from the same budget? How, if the budget is increased or decreased, can it be allocated across different products and media types, to maximum effect? How are tradeoffs made between sales and image?"

Curriculum revision

Chalmers F. Sechrist Jr., vice president (1990) of the IEEE Education Society, told us that, at the present time, most attention is focused on restructuring the curriculum of the first two years of college. He predicted a major restructuring, updating, and modernizing of the undergraduate engineering core at a number of institutions during the 1990s because engineers of the 21st century will be expected to solve a broader and more complex set of problems and to accept more leadership positions in industry and government.

Other trends he foresaw include:

- Integration of mathematics, chemistry, physics, and some engineering courses in order to improve the connections between present courses and those taken previously.
- Integration of more computing, design, and oral and written communications into the curriculum.
- More emphasis on global awareness, improving the quality of life, international experiences, business, management skills, and the importance of engineering education.
- More exposure to nontechnical subjects such as ethics, safety, economics, and the impact of technology on society.
- Implementation of new instructional and learning methods using technology-based approaches.
- More emphasis on interactive methods in which students work together in interdisciplinary teams to learn cooperatively and to solve complex engineering design problems.

Integrated-document interchange needed

A major impediment to universal adoption of Wysiwyg (what-you-see-is-what-you-get) publishing and word-processing systems is the poor interchangeability of integrated documents among different platforms, said David L. McKown, member of the administrative committee and chair of the Ad Hoc Committee on New Communication Technology, IEEE Professional Communication Society. He explained why this is so:

"While several vendors now sell software that integrates text and graphics, and several of those offer that software on many hardware operating-system platforms, the ability to transfer integrated documents intact from one software package to another generally does not exist. This means that, although a user of WordPerfect on an MS-DOS platform can share integrated documents with a user of WordPerfect on a VAX, that same user cannot share integrated documents with a Microsoft Word user on any platform. The path to interchange involves separately converting the text and graphics into file formats that can be read by the other system, importing them separately, and then reintegrating the document."

Still, before this can become a useful reality, McKown said, improvements in data storage capacity and speed and processing power will be necessary. ♦

Figure 10: The IEEE Spectrum, for the first time, writes about the NNC [17].

- ▶ A proposal for the NNC newsletter, CONNECTIONS, is first considered.
 - ▶ Due to violations in written agreement, the NNC AdCom votes to cancel “the Agreement [for jointly sponsoring IJCNN’s] between the Council and the International Neural Network Society (INNS) immediately after the 1992 Baltimore IJCNN.”
 - ▶ The NNC Standards Committee becomes a standing committee of the Council. Walter Karplus (UCLA) is the first Chair.
- April 22: The NNC ExCom has a teleconference meeting.
- ▶ “There was consensus that the Council should move towards a Society by 1993...”
 - ▶ The budget for first IEEE International Conference on Fuzzy Systems (Fuzz-IEEE) is submitted by James C. Bezdek.
 - ▶ A committee is appointed to draft a proposal for the IEEE TRANSACTIONS ON FUZZY SYSTEMS. James C. Bezdek is the Chair.
 - ▶ Announcement of first IEEE book co-sponsored by the NNC: **Neural Networks : Theoretical Foundations and Analysis** by Clifford Lau (ONR). The IEEE Circuits & Systems Society is the other co-sponsor.
 - ▶ There is discussion of the first WCCI. The working title is *World Congress on Intelligent Systems*.
- May 1991: The first issue of the NNC Newsletter, THE INTELLIGENCE CONNECTION¹⁰ is issued. (See Figure 11.) Wesley E. Snyder is the Newsletter Editor.
- July 8-14: The IJCNN is held in Seattle.¹¹ (See Figures 1 on page 4 and 12.)
- ▶ The conference committee included
 - David Rumelhart (Stanford), Chair
 - Demetri Psaltis (Cal Tech) and Larry Jackel (AT&T), Program Chairs
 - ▶ President’s Forum (See Figure 13.) The NNC hosted a meeting among the leaders of the world’s neural network societies to foster cooperation. Attending are [23]
 1. Chinese Neural Network Council: Prof. Youshaw Wu, (Tsinghua University, Beijing) President, and Dr. Zong Sha (Chinese Institute of Electronics, Beijing) and Prof Yi-Xin Zhong (University of Posts & Telecon, Beijing).

¹⁰Later changed to CONNECTIONS.

¹¹There are two IJCNN’s held in 1991. The other, in November, is held in Singapore.



IEEE Neural Networks Council

the intelligence CoNNECTION

VOLUME 1

NUMBER 1

MAY 1991

President's Corner: *The Focus of the Council*

Robert J. Marks II



The majority of papers submitted to the 1991 Seattle IJCNN deal with applications. This, I believe, is further evidence that the field of artificial neural networks has matured significantly in the last few years. The interest and activity in neural networks is at a higher level than ever before. The charter of the *IEEE Neural Networks Council* is to continue the

nurturing of this maturation through technical conferences and publications.

Around the maturing of the field of artificial neural networks have sprouted other new and exciting biologically motivated computational paradigms, including genetic algorithms and evolutionary programming. Training methods not constrained to neural network architectures are attracting much attention. The more mature field of fuzzy systems is emerging as a singularly significant field of technology.

The *Neural Networks Council* is dedicated to involvement in these and other emerging technologies in the field of intelligent systems. As you can see elsewhere in this newsletter, we will be sponsoring in February 1992 the

first ever *IEEE International Conference on Fuzzy Systems*. This is the first IEEE conference of international scope ever dedicated solely to the topic of fuzzy systems. The Council's *Transactions on Neural Networks* will also soon have a special issue devoted to the topic.

The newly introduced Neural Network Council Forum series of smaller scale meetings allows flexibility to explore other evolving areas in the field of intelligent systems. (Watch for the announcement of Forum meetings in Council publications.) As is the case with artificial neural networks, the Council will play a major role in the evolution and maturing of these new and exciting related technologies.

IEEE Neural Networks Council Constituent Societies

Circuits and Systems Society
Communications Society
Control Systems Society
Engin. in Medicine & Biology Soc.
Industrial Electronics Society
Industry Applications Society
Information Theory Society
Lasers and Electro-Optics Society
Oceanic Engineering Society
Robotics and Automation Society
Signal Processing Society
Systems, Man & Cybernetics Soc.

Council President: Robert J. Marks, II
University of Washington

Vice President: Russell Eberhart
Johns Hopkins U. Applied Physics Lab

Secretary:
Evangella Michell-Tzanakou
Rutgers University

Treasurer: Patrick K. Simpson
General Dynamics Electronics Div.

IEEE Trans. on Neural Networks Editor:
Michael W. Roth, Johns Hopkins U.
Applied Physics Lab.

Standing Committee Chairs:

Meetings: Roy S. Nutter, Jr.

West Virginia University

Standards: Walter Karplus, UCLA

Publications: Toshio Fukuda
Nagoya University

Awards: Bradley Dickinson
Princeton University

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THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS

Figure 11: Front page of the NNC's first issue of its newsletter.

2. European Neural Network Society: Prof. John Taylor (King's College, London), Vice President, and Rolf Eckmiller (University of Dusseldorf), Vice President.
3. International Neural Network Society: Dr. Harold H. Szu (Naval Research Lab, Washington D.C.), Treasurer.
4. Japanese Neural Network Society: Dr. Kunihiko Fukushima (Osaka University, Japan), President.
5. Russian Neural Network Society: Dr. Witali Dunin-Barkowski, President.
6. IEEE Neural Network Council: President R.J. Marks II and Vice President Russell Eberhart

■ July 8: NNC AdCom Meeting is held in Seattle.

- ▶ The 1992 NNC Officers are elected.
 - Russell Eberhart, President
 - Patrick K. Simpson (ORINCON and now President of Scientific Fisheries, Ankorage), Vice President
 - Roy Nutter (West Virginia University), Treasurer
 - Toshio Fukuda (Nagoya University), Secretary
- ▶ Proposal for IEEE TRANSACTIONS ON FUZZY SYSTEMS is approved. James C. Bezdek chaired the proposal committee.
- ▶ The first AdCom discussion of WCCI occurred. The working title remains the *World Congress on Intelligent Systems*.
- ▶ The first NNC Neural Network Pioneer Awards are announced. Recipients are Stephen Grossberg, Teuvo Kohonen and Bernard Widrow.
- ▶ The NNC Fellows Committee is formed. Brad Dickinson serves as Chair.
- ▶ The field of interest of the NNC is changed.

“The field of interest of the [Neural Network] Council and its activities and programs shall be the theory, design, application and development of biologically and linguistically motivated computational paradigms involving neural networks, including connectionist systems, genetic algorithms, evolutionary programming, fuzzy systems, and hybrid intelligent systems in which these paradigms are contained.”

■ July 23: IEEE TAB completes their review of the NNC. Their report states “Overall impression [of the NNC] is one of a new, enthusiastic Council trying to cope with fantastic interest in new, vital and growth topic of neural networks.”

■ November 18-21: The IJCNN is held in Singapore (See Figures 14, 15 and 16)



IJCNN '91—SEATTLE



SEATTLE, WA, U.S.A.

July 8–12, 1991

THE International Joint Conference on Neural Networks (IJCNN) is sponsored by the International Neural Network Society (INNS) and the Institute of Electrical and Electronics Engineers, Inc. (IEEE). This Annual IJCNN conference is scheduled for July 8–12, 1991, in Seattle, Washington, at the Seattle Convention and Trade Center.

The Annual Conference of IJCNN has grown to become the largest neural network, hybrid, and fuzzy systems conference in the world. Its importance lies in its ability to unify the broad and diverse fields of this multidiscipline technology. The purpose of the conference is to provide a forum for dissemination of the latest scientific and technical information in engineering, biology, psychology, computer science, and other sciences which may have a bearing on intelligent systems and to give the participants a sense of the future directions of these burgeoning technologies. This is accomplished through presentation of invited and contributed papers and tutorials and through panel discussions and exhibits. Researchers, scientists, engineers, consultants, application specialists, and students from the fields of finance, biology, robotics, computer science, medicine, industry, aerospace, transportation, mathematics, electrical engineering, and other fields of science will attend IJCNN'91-SEATTLE. Exhibitors will present the latest in neural networks, including neurocomputers, VLSI neural networks, implementations, software systems, and applications at IJCNN'91-SEATTLE, which is the neural network industry's largest trade show.

David E. Rumelhart of Stanford University is the conference chairman. Demetri Psaltis of Caltech and Larry Jackel of AT&T are the program cochairs.

Plenary speakers are Geoffrey Hinton of the University of Toronto, Jack Cowan of the University of Chicago, and Rodney Brooks of MIT.

Invited speakers are Shun-ichi Amari of Tokyo University, Yasser Abu-Mostafa of Caltech, Tomaso Poggio of MIT, Dana Ballard of the University of Rochester, Gerald Tesaro of IBM, George Cybenko of the University of Illinois, Stephen Omohundro of ICSI, Lawrence Rabiner of AT&T, and Christoph von der Marlsburg of Ruhr Universität Bochum.

The proposed tutorial schedule for IJCNN'91-SEATTLE is: Terrence Sejnowski of the Salk Institute ("Neuroscience for Neural Networks") and Richard Lippmann of MIT Lincoln Labs ("Pattern Classification Using Neural Networks"). These plenary tutorials will be presented on July 8,

1991, from 8:00 AM to 10:00 AM at the Washington State Convention and Trade Center.

Two (2) hour topical tutorials will follow the plenary tutorials and will include James Anderson of Brown University ("Cognitive Science: Software Hints for Neural Net Hardware"), Mitsuo Kawato of ATR ("Trajectory Formation and Control of Redundant Robots"), Federico Faggin of Synaptics ("VLSI Implementation of Neural Networks"), Yasser Abu-Mostafa of Caltech ("Learning in Neural Nets: Information vs. Complexity"), Thomas Brown of Yale University ("Neuronal Plasticity and Learning"), Robert Hecht-Nielsen of HNC ("Neurocomputing Applications"), Francoise Fogelman of Mimetics ("Neural Networks for Pattern Recognition"), John Moody of Yale University ("Learning, Generalization and Model Selection"), Alex Waibel of Carnegie Mellon ("Neural-Net Speech Recognition"), Stephen Grossberg of Boston University ("Unsupervised Learning"), Bernard Widrow of Stanford University ("Theory and Applications of Learning Algorithms in the Madeline and Backpropagation Family"), and Paul Werbos of NSF ("A Current Overview of Neurocontrol").

The cost for tutorials is \$195 and the deadline for registration for tutorials is April 30, 1991. Tutorial registration on site will be \$295. Copies of the materials presented will be available at the individual tutorial sessions.

The cost of IJCNN'91-SEATTLE is \$195 for INNS & IEEE members for early registration, deadline March 1, 1991. Early registration for nonmembers is \$295 and students will pay \$50. Late registration will be honored until June 1, 1991, to members @ \$295, nonmembers @ \$395, and students @ \$75. On-site registration will be \$395, \$495, and \$95 respectively. Full conference registration includes admission to all sessions, exhibit areas, and receptions, plus proceedings. Tutorials are not included.

Special evening sessions during IJCNN'91-SEATTLE will include an International Government Panel, Industry Panel, Fuzzy Systems Panel, and Deployed Applications of Neural Networks.

For the convenience of attendees traveling to IJCNN'91-SEATTLE, Dikmen Travel, Inc., has been designated the North American Official Travel Agency. Contact Dikmen Travel and identify yourself as an IJCNN'91-SEATTLE attendee: (800) 284-3386 Monday–Friday, 8:30 AM–5:30 PM. FAX (206) 441-3092 and TELEX 703908.

Sarah Eck, University of Washington, Conference Management:
(206) 543-0888 or FAX (206) 685-9359

Figure 12: Seattle IJCNN 1991, Call for Papers.

NEURAL NETWORKS PRESIDENTS' FORUM

Sponsored by
THE IEEE NEURAL NETWORKS COUNCIL

Participants:

Professor Zong Sha, President
Chinese Neural Networks Committee
CHINA

Professor Rolf Eckmiller
Joint European Neural Network Initiative
EUROPE

Kunihiko Fukushima, President
Japanese Neural Networks Society
JAPAN

Professor Witali L. Dunin-Barkowski, President
Russian Neural Network Society
USSR

Moderator

Professor Robert J. Marks II, President
IEEE Neural Networks Council

Tuesday, July 9, 1991

6:30 p.m. - 8:00 p.m.

Room 612

**Washington State Convention Center
Seattle, Washington**



Figure 13: President's Forum at Seattle IJCNN

- ▶ The conference committee includes
 - Teck-Seng Low (National University of Singapore), General Chairman. See Figure 16.
 - Russell Eberhart, Vice Chair
 - Sun-Ichi Amari, Japan Liaison
 - Robert J. Marks II, USA Liaison
 - Fernando Aldana (Universidad Politecnica De Madrid), European Liaison
 - ▶ 448 papers are accepted of the 543 submitted.
 - ▶ A meeting report by General Chairman Low is in Figure 17 and 18 [20].
- November 18: The NNC ExCom holds a meeting in Singapore.

1992

- Lotfi A. Zadeh, founder of fuzzy logic, is awarded the 1992 IEEE Richard W. Hamming Medal.¹² His citation reads:
- “For seminal contributions to information science and systems, including the conceptualization of fuzzy sets.”
- January 1992: The IEEE Spectrum, for the second time, features neural networks as a specialty field [18]. Fuzzy systems are also addressed. (See Figure 19.)
- IEEE TNN
- ▶ The first TNN Outstanding Paper Award given to K.S. Narendra and Kannan Parthasarathy [31].
 - ▶ Robert J. Marks II is appointed the third Editor-In-Chief of the TNN.
 - ▶ The page budget of the IEEE TNN are increased for 1992 from 640 to 960.
 - ▶ The IEEE TNN, formerly issued quarterly, is now bimonthly.
- The IEEE TRANSACTIONS ON FUZZY SYSTEMS (TFS) is approved by IEEE and begins publishing in 1993. The first call for papers is published in the NNC’s CONNECTIONS newsletter. (See Figure 20.)
- The first NNC sponsored books are published by the IEEE Press. Stamatios V. Kartalopoulos (now at University of Oklahoma) is the NNC Liaison to the IEEE Press. The first books are:

¹²The IEEE Richard W. Hamming Medal was established by the Board of Directors in 1986 “for exceptional contributions to information sciences, systems and technology.”



IJCNN '91 SINGAPORE

INTERNATIONAL JOINT CONFERENCE ON NEURAL NETWORKS

WESTIN STAMFORD & WESTIN PLAZA - SINGAPORE NOVEMBER 18-21, 1991

CALL FOR PAPERS

ORGANISING COMMITTEES:

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Dr G. S Hong

Dr Marcelo H. Ang Jr.

Dr Chee - Leong Teo

Dr Ian Flood

Dr Tong - Hieng Lee

Dr Kah-Bin Lim



The IEEE Neural Networks Council and the International Neural Network Society (INNS) invite all persons interested in the field of Neural Networks to submit FULL PAPERS for possible presentation at the Conference.

FULL PAPERS must be received by **31 May 1991**. All submissions will be acknowledged by mail. International authors should submit their work via Air Mail or Express Courier so as to ensure timely arrival.

Papers will be reviewed by senior researchers in the field, and all authors will be informed of the decisions at the end of the review process. A limited number of papers will be accepted for oral and poster presentation. All papers accepted will be published in full in the Conference Proceedings which will be available at the Conference for distribution to all regular Conference registrants. **Only the abstracts of all papers accepted will be published in the final programme.**

FULL PAPERS may be submitted for consideration as oral or poster presentations in the following sessions:

- Associative Memory
- Electrical Neurocomputers
- Image Processing
- Invertebrate Neural Networks
- Machine Vision
- Neurocognition
- Neuro-Dynamics
- Optical Neurocomputers
- Optimization
- Robotics Control
- Sensation & Perception
- Sensorimotor Control Systems
- Supervised Learning
- Unsupervised Learning
- Neuro-physiology
- Hybrid System (A1, Neural Networks, Fuzzy System)
- Mathematical Methods
- Applications

REQUIREMENTS

Eight copies (One original and seven copies) are required for submission. **Do not fold or staple the original, camera-ready copy.** Papers of no more than 6 pages, including figures, tables, and references, should be written in English and only complete papers will be considered. There will be a charge of US\$ 50 per page for papers exceeding 6 pages.

Papers must be submitted camera-ready on 8 1/2" X 11" white bond paper with 1" margins on all four sides. They should be prepared by typewriter or letter quality printer in one-column format, single spaced or similar type style of 10 points of larger and should be printed on one side of the paper only. **FAX submissions are not acceptable.**

Centred at the top of the first page should be the complete title, author name (s), affiliation(s) and mailing address(es). This is followed by a blank space and then the **abstract, up to 15 lines, followed by the text.**

In an accompanying letter, the following must be included:

- Corresponding author :
 - Name
 - Mailing address
 - Telephone & FAX numbers
- Presentation preferred :
 - Oral
 - Poster
- Technical session :
 - 1st Choice
 - 2nd Choice
- Presenter :
 - Name
 - Mailing address
 - Telephone and FAX numbers

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Fax: 34-1-534 9466

SECRETARIAT

IJCNN '91 SINGAPORE, Communication International, Associates Pte Ltd., 44/46 TANJONG PAGAR ROAD, SINGAPORE 0208.
Tel: 651 226 2636 Fax: 651 225 2577 221 8916

Figure 14: 1991 Singapore IJCNN call for papers.

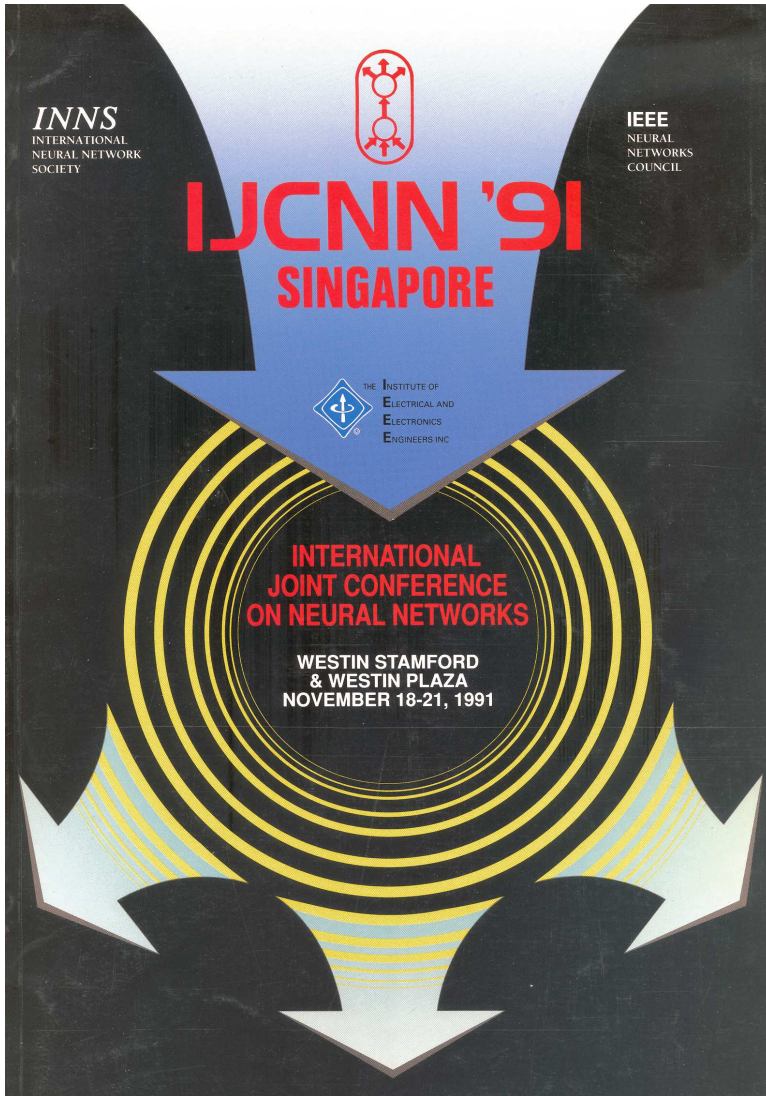


Figure 15: 1991 Singapore IJCNN Program.

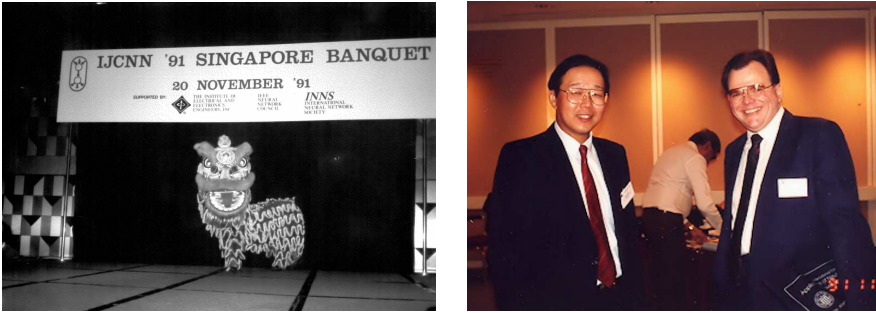


Figure 16: LEFT: Entertainment at the 1991 IJCNN in Singapore. RIGHT: At the 1991 Singapore IJCNN: Teck-Seng Low (left) and NNC President, Robert J. Marks II.

IJCNN 91 Singapore: The International Joint Conference on Neural Networks

Teck Seng Low, General Chairman

Singapore hosted the first IJCNN to be held outside the US from November 19-21, 1991. The conference was sponsored by the IEEE Singapore Section, the IEEE Neural Networks Council, and the INNS. It attracted 200 tutorial attendees and 600 conference attendees. A total of 457 papers were accepted for presentation at the conference. The breakdown of paper submission and attendees showed IJCNN 91 Singapore to be a truly international. It reflects the pace of Neural Network research around the world. IJCNN 91 Singapore also provided an opportunity for the 200 student attendees from all over the world to meet.

On the opening day seven tutorials were conducted. This was followed in the evening by a welcome reception and a public lecture by Prof. Terrence Sejnowski. This lecture, "Neural Computation", was organized for the Singapore public, including high school students, and conference attendees and the popularity of the lecture filled the 600 capacity hall to the brim. This lec-

ture was co-sponsored by the National Science and Technology Board of Singapore who also co-sponsored the seminar by Dr. Tom Caudell of Boeing Corp. at the National University of Singapore on the 22 November.

The conference from 19-21 November saw high attendance at the plenary addresses given by Prof. Kohonen, Prof. Nishikawa and Prof. Narendra. The invited talks by Pro-

fessors Eckmiller, Fukuda Lacher, Sejnowski and Drs. Eberhart, Bulsara, Kawato and Allinson were also well received.

The poster sessions proved popular and many were very well presented. This may be due to the US\$50 award for the best poster presentation at each of the six sessions.

In line with the increased applications of neural networks in industry and their possible impact in the finance and banking industry, and



IJCNN attendees learn local dances at the conference banquet. (Photo courtesy Bob Marks)

Figure 17: 1991 Singapore IJCNN meeting report [20]. (Continued in Figure 18.)

Shiro Usui, NNC AdCom member (left), Russ Eberhart, 1992 NNC President, and Roy S. Nutter, 1992 NNC Treasurer at the Presidents Dinner. (Photo courtesy Bob Marks)



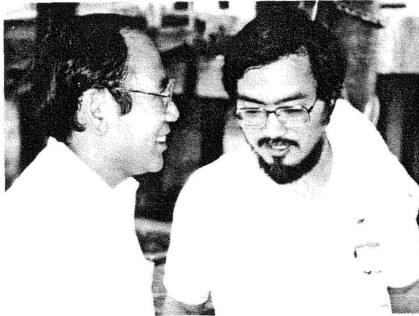
provided for all attendees. This created ample opportunities for intellectual and social interaction, an aspect of IJCNN 91 Singapore which was very much appreciated by all who attended.

In conclusion, IJCNN 91 Singapore was a tremendous success. The visibility of IJCNN on the international stage has been firmly planted. The international atmosphere at IJCNN 91 Singapore and the enthusiasm and goodwill generated testifies to the transnationalism of technology and the benefits of international conferences.

industry panel chaired by Dr. Caudell from Boeing and a financial applications panel chaired by Dr. Deboeyck of the World Bank were organized.

A highlight of the conference was the Banquet on the evening of 20 November. Attendees were treated to a nine-course Chinese dinner and a cultural show which described Singapore's cultural diversity. It was a most enjoyable evening.

During the length of the conference, lunches and coffee were



Clifford Lau (left), Chair of the 1992 Baltimore IJCNN and Toshio Fukuda, Chair of the 1993 Nagoya IJCNN on a cruise in Singapore Harbour. (Photo courtesy Bob Marks)

IEEE Neural Networks Council Newsletter 6

Figure 18: 1991 Singapore IJCNN meeting report [20]. (Continued from Figure 17.)

1. Clifford Lau (Office of Naval Research (ONR)), editor, **Neural Networks, Theoretical Foundations & Analysis**, IEEE Press (1992).
2. E. Sánchez-Sinencio (Texas A&M) and Clifford Lau, editors, **Artificial Neural Networks**, (1992).¹³
3. James C. Bezdek and Sankar K. Pal (Indian Statistical Institute), editors, **Fuzzy Models for Pattern Recognition Methods That Search for Structures in Data**, IEEE Press 1992.¹⁴

■ January 18: The NNC ExCom meets at Research Triangle Institute, North Carolina.

- ▶ ExCom endorses formation of *IEEE Virtual Reality Annual International Symposium* (VRAIS).
- ▶ The first steps in forming the IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION were tasked to Patrick K. Simpson.

¹³See Figure 21.

¹⁴See Figure 21.

The specialties

- **Neural-network-fuzzy-logic nexus shows promise**
- **Quality-color costs decline for word processing and publishing**
- **Electromagnetic compatibility acquires a higher profile**
- **Engineering education up for major changes**

Neural networks are being coupled to fuzzy systems. . . new publishing and word-processing software can work in full color. . . methods of measuring electromagnetic compatibility (EMC) have improved. . . important changes in undergraduate engineering education are imminent. These comments on some of the more specialized branches of electrical engineering come from the IEEE Neural Networks Council, the IEEE Professional Communication Society, the IEEE Electromagnetic Compatibility Society, and the IEEE Education Society.

Robert J. Marks II, president of the IEEE Council on Neural Networks, calls the networks an extraordinary engineering tool, which is here to stay. They are already currently viable in a number of applications and useful, dedicated hardware is available. A promising area, he said, is the coupling of neural networks to fuzzy systems. "Layered perceptrons [feedforward artificial neural networks] can be taught fuzzy membership functions from raw data. Rules are thereby empirically learned."

A related discipline, Marks pointed out, is the genetic algorithm and associated evolutionary programming. The terminology, he said, "relates only loosely to the biological counterpart, not unlike reference to 'rabbit ears' or an 'electronic eye.' Genetic algorithms perform a highly parallel search of use in, say, the design and optimization of neural network architectures." But, Marks emphasized, as a technology, genetic algorithms and fuzzy nets are where neural networks were about a decade ago.

COLOR TAKEOVER. Prices have dropped and quality has surged in color scanners, color printers, and film recorders, according to David L. McKown, a member of the administrative committee of the IEEE Professional Communication Society. "Publishing (and even word-processing) software capa-

Ronald K. Jurgen Senior Editor

ble of working either full or 'spot' color is becoming readily available," he said. Today self-publishers can "afford to collect peripherals for scanning images in 256 colors, displaying them on monitors capable of 2000-by-2000 resolution or more, editing them using the unbelievably rich palette of colors of 24-bit systems, and printing them, unfortunately, on relatively low-resolution (100-dot-per-inch) printers."

But these tools encounter patches of ignorance, McKown emphasized. Few self-publishers (as compared with publishing houses) are trained in the intricacies, principles, and effects of color on an audience, so the color piece produced is too often "the design equivalent of ransom note typography." For another, what will the self-publisher do with the printed output? The original will have to be sent to a professional printer for color separation and printing, in which case "300-dpi resolution is usually unacceptably low."

The professional publisher faces many of the same problems. "The professional designer who used to specify colors on a tissue overlay and had a trusted printer implement them," McKown said, "now may use the software to change the colors in as many ways as are imaginable." But, he asked, "how accurately does the system monitor portray printed colors? How true to ink is the proof printer? How dependent will the designer become on the world of color created by electrons impinging on phosphorus and how estranged from the real world of pigments on paper?"

TAMING EMC. Electromagnetic compatibility has matured as a technology over the past several years, reported H. R. Hofmann, newly elected president of the IEEE Electromagnetic Compatibility Society. "Methods of performing EMC measurements have been enhanced with the aid of more sophisticated receivers including improved spectrum analyzers and antennas. The importance of accurate antenna factors has hit home, and techniques for measuring antenna factors have been widely disseminated."

Hofmann also said that the ability to make more repeatable measurements has spread with the publication of IEEE and ANSI standards on EMC measurement techniques and procedures. And, he maintained, new Federal Communications Commission rules on emissions have forced designers to deal with EMC early in the design process or else provide expensive, last-minute Band-Aid types of fixes.

William E. Cory of the administrative committee of the Society, said that, as an aid to the deliberations of the International Special Committee on Radio Interference, several countries reported on the incidence and causes of their electromagnetic interference (EMI). A first look, he said, showed that the number of occurrences reported is approximately proportional to the country's population.

In Japan and Norway, broadband noise from electric power distribution and motor-based appliances were said to be the major sources of EMI. In the United States, radio transmissions formed over two-thirds of the EMI sources.

ENGINEERING EDUCATION TRENDS. We are on the threshold of innovative changes in undergraduate engineering education, maintained Chalmers F. Sechrist Jr., president of the IEEE Education Society. One reason, he said, is the recommendations prepared during the 1980s by six entities: the IEEE Centennial Forum, the National Science Board, the American Society for Engineering Education (ASEE) Quality of Engineering Education Project, plus the Accreditation Board for Engineering and Technology National Congress on Engineering Education, the ASEE Task Force on a National Action Agenda for Engineering Education, and the National Science Foundation (NSF) Disciplinary Workshops on Undergraduate Education. Another reason is the increased NSF funding for innovative courses and curricula in undergraduate education in science, engineering, and mathematics.

Specific trends pointed out by Sechrist include:

- Engineering courses for nonengineers and, for engineering students, more interdisciplinary courses.
- More emphasis on engineering design, manufacturing, and concurrent engineering.
- Computer and design experiences in the freshman year.
- More emphasis on computer-aided instruction, education at a distance over communications links, and laboratory simulations.
- More use of engineering workstations.
- Improved student retention and advising.

Innovative programs incorporating those trends are taking shape at several universities, Sechrist reported, including Drexel, Cornell, Texas A&M, Maryland, Pennsylvania State, Texas Tech, and Vanderbilt, as well as at Rose-Hulman Institute of Technology and New Jersey Institute of Technology. ♦

Figure 19: IEEE Spectrum, January 1992 [18].

ANNOUNCEMENT AND CALL FOR PAPERS

IEEE TRANSACTIONS ON FUZZY SYSTEMS

The Neural Networks Council, which is composed of twelve member Societies of the IEEE, is pleased to announce the sponsorship and establishment of a new archival publication on fuzzy sets and system design. The journal will be called the *IEEE Transactions on Fuzzy Systems*, and has been defined as having the following scope:

SCOPE OF THE *IEEE TRANSACTIONS ON FUZZY SYSTEMS*

The *IEEE Transactions on Fuzzy Systems* will publish highest quality archival technical papers in the theory, design and application of fuzzy systems. Readers are encouraged to submit papers which disclose significant technical knowledge, exploratory developments and applications of fuzzy systems. Emphasis will be given to engineering systems and scientific applications. The *TFS* will also contain brief papers and letters which describe and report information of current interest; and comments and rebuttals submitted in connection with published papers.

Representative applications areas include the following aspects of fuzzy systems:

1. Estimation, prediction and control
2. Approximate reasoning
3. Intelligent systems design
4. Machine learning
5. Image processing and machine vision
6. Pattern recognition
7. Computational neural networks
8. Electronic and photonic implementation
9. Medical computing applications
10. Robotics and Motion Control
11. Constraint Propagation and Optimization
12. Civil, Chemical and Industrial Engineering Applications

The first issue of the *IEEE Transactions on Fuzzy Systems* will be sent free of charge to all subscribers of its sister publication, the *IEEE Transactions on Neural Networks*. Authors are encouraged to submit five (5) copies of prospective contributions in the standard format of IEEE transactions, together with an IEEE copyright release, to the editor at the following address:

James C. Bezdek, Editor
Division of Computer Science
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Pensacola, Florida
32514 USA

Tel.: (904) 474-2784
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jbezdek@ai.uwf.edu
jbezdek@uwf.bitnet

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Figure 20: The call for papers for IEEE TFS, scheduled to debut in 1993, is published in the May 1992 issue of the NNC newsletter, CONNECTIONS.

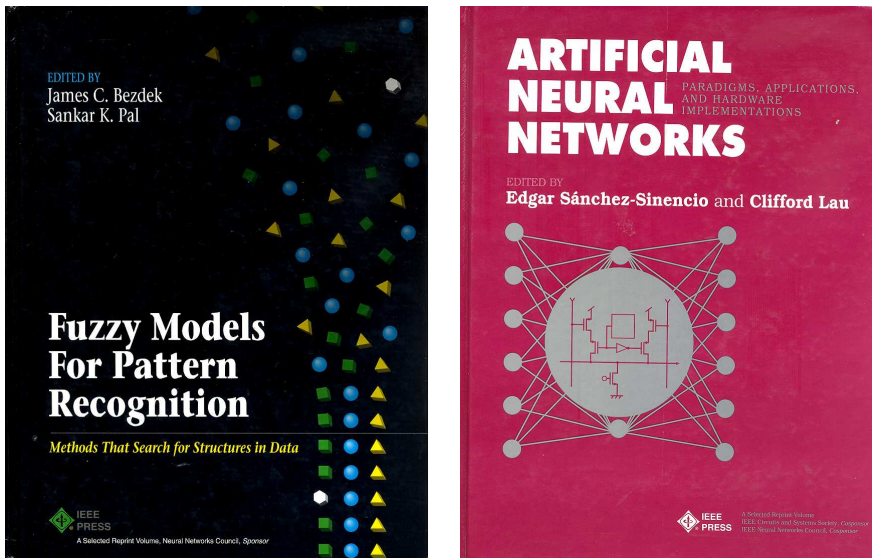


Figure 21: Two of the first books from IEEE Press sponsored by the IEEE NNC.

► *Regional Interest Groups* (RIG's) are established.

■ March 8-12, The *First International Conference on Fuzzy Systems* (FUZZ-IEEE) is held in San Diego. (See Figure 22.)

When this conference was held, there were only two people who were the undisputed founders of major electrical/computer engineering fields. One was Claude Shannon (Bell Labs) who single handedly founded information theory in his classic 1948 paper. The other is Lotfi Zadeh whose 1965 paper establishing fuzzy logic [44] has been cited thousands of times. Japan's engineers were applying fuzzy control to a plethora of products [27].

FUZZ-IEEE becomes the flagship conference in the field of fuzzy systems. James C. Bezdek, the conference Chair, reports "There were 512 registrants at FUZZ-IEEE '92, which is about 150 more than the largest conferences ... devoted to fuzzy systems have ever had..." "A majority [314] of attendees were affiliated with American industry..." (See Figures 23 and 24 for another account of the first FUZZ-IEEE.)

► The conference committee included:

- James C. Bezdek as the Chair.
- Didier Dubois and Henri Prade (Both from the University of Toulouse, France) as the Program Chairs, and
- Lotfi A. Zadeh as the Honorary Chair.

- ▶ The conference is held at the same venue as the (first) ICNN '87: The Town & Country Hotel in San Diego.
 - ▶ For this first meeting, James C. Bezdek coins the “FUZZ-IEEE” contraction of *International Conference on Fuzzy Systems*. The term is still used today.
 - ▶ There are 5 tutorials with a combined attendance of 302.
- March 8: The NNC AdCom is held at Fuzz-IEEE in San Diego.
- ▶ A proposal for holding the first VRAIS is approved.
 - ▶ The AdCom approves the changing of its title to the *IEEE Intelligent Systems Council*. The motion is eventually defeated at TAB.
- May 1992: In CONNECTIONS, Russell Eberhart, NNC President, describes publicly for the first time reasons for dissolving the IJCNN's and returning to ICNN's [9]. (See Figures 25 and 26.) Later, issues were resolved and the IJCNN's resumed.
- June 6: The IEEE NNC Genetic Algorithm / Neural Network Forum is held in Baltimore. Russell Eberhart is the Chair.
- ▶ This is the NNC's first conference on GA's and evolutionary computing.
 - ▶ There are 82 attendees.
- June 7-10: The IJCNN is held in Baltimore.¹⁵ (See Figure 27).
- ▶ The conference committee includes:
 - Clifford Lau, Chair,
 - Bernard Widrow (Honorary Chair), and
 - John Shynk (UC Santa Barbara), Program Chair.
 - ▶ There are 1125 attendees.
 - ▶ This is the first IEEE conference where proceedings are distributed on CD's. Coordinators of this effort were Russ Eberhart and Mani Soma (University of Washington).
 - ▶ The Plenary talk was given by Leon Cooper (Brown University) on *Synaptic Plasticity in the Visual Cortex: Toward a Molecular Basis for Learning and Memory Storage*. Cooper was awarded the 1972 Nobel Prize in physics (with John Bardeen and John Robert Schrieffer) on the understanding low temperature superconductors.
 - ▶ A conference report by Chairman Lau is in Figure 28 [19].
- June 7: The NNC AdCom meets in Baltimore.

¹⁵There are two IJCNN's this year. The second is held in Beijing in November.

FUZZ-IEEE '92

IEEE INTERNATIONAL CONFERENCE ON FUZZY SYSTEMS MARCH 8-12, 1992 • TOWN & COUNTRY HOTEL
San Diego *California*

Honorary Chair: **Loffi Zadeh**, University of California, Berkeley
General Chair: **Jim Bezdek**, University of West Florida

PLENARY SESSIONS	TUTORIAL SESSIONS
Fuzzy Control: Principles, Practices and Perspectives Michio Sugeno	Basic Concepts of Fuzzy Control Hamid Berenji
Fuzzy Information Systems Fred Petry Bill Buckles	Basic Concepts of Fuzzy Sets and Logic Enrique H. Ruspini
Possibility Theory as a Basis for Preference Propagation in Automated Reasoning Didier Dubois Henri Prade	Engineering Applications of Fuzzy Systems Michio Sugeno
Interpolative Reasoning in Fuzzy Logic and Neural Network Theory Loffi Zadeh	Fuzzy Information Systems Piero P. Bonissone
Fuzzy Sets and Approximate Reasoning in Decision Making Ron Yager	Hardware and Software Tools Masaki Togai Erik Horstkotte Doug Leo

REGISTRATION
Full conference registration includes admission to all sessions, exhibit area, reception, banquet, and Proceedings. Register for TUTORIAL Sessions separately. For specific registration and exhibit information, please contact:
FUZZ-IEEE '92 Conference Headquarters
Meeting Management
5665 Oberlin Drive, Suite #110
San Diego, CA 92121
Tel: 619/453-6222
Fax: 619/535-3880



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Figure 22: The 1992 FUZZ-IEEE meeting is the first IEEE conference on fuzzy systems.

Conference Report: IEEE FUZZ-IEEE, 1992

Towards a synthesis of fuzzy logic and neural networks

James C. Bezdek
University of West Florida
General Chair

The First IEEE International Conference on Fuzzy Systems (FUZZ-IEEE '92) was held in San Diego on March 8-12, 1992. The conference was sponsored by the IEEE Neural Networks Council (NNC), the first organ of the IEEE which has shown a concentrated interest in fuzzy systems since their inception in 1965. Thus, it seems appropriate at this point to first thank the NNC (in particular, Russ Eberhart, Bob Marks, Pat Simpson, and Mike Roth) for their interest, enthusiasm and support for the conference.

The conference was commissioned in January, 1991, and was put together in a very short timeframe. Although there were a few glitches due to this, everything ran smoothly, due in no small part to the able and diligent work of the program co-chairs, Profs. Didier Dubois and Henri Prade of the Universite Paul Sabatier. Local arrangements were handled by the local section of the IEEE, managed by Jim Bussert; his gang contributed greatly to the pleasant atmosphere at the conference.

Why an IEEE conference on fuzzy systems? And more particularly, why done under the aegis of the NNC? Here are some compelling answers.

There has been, in the last five years, a large and energetic upswing in research efforts aimed at synthesizing fuzzy logic with computational neural networks (CNNs). There are several reasons for this.

First, the enormous success of commercial applications which are at least partially dependent on fuzzy technologies fielded (in the main) by Japanese companies has led to a surge of curiosity about the utility of fuzzy logic for scientific and engineering applications.

Second, the marriage of fuzzy logic with CNN's has a sound technical basis, because these two approaches generally attack the design of "intelligent" systems from

quite different angles. CNN's are essentially low level, computational algorithms that (sometimes) offer good performance in dealing with sensor data used in pattern recognition and control.

On the other hand, fuzzy logic was introduced in 1965 by Lotfi Zadeh as a means for representing, manipulating and utilizing data and information that possess non-statistical uncertainty. Thus, fuzzy methods often deal with issues such as reasoning on a higher (semantic or linguistic) level than CNNs.

Consequently, the two technologies often complement each other, CNNs supplying the brute force necessary to accommodate and interpret large amounts of sensor data; and fuzzy logic providing a structural framework that utilizes and exploits these low level results.

Third, there seem to be many ways to use either technology as a "tool" within the framework of a model based on the other. For example, the CNN is well known for its ability to represent functions. The basis of every fuzzy model is the membership function. So, a natural application of CNNs in fuzzy models is to provide good approximations to the membership functions that are essential to the success of any fuzzy approach.

Broadly speaking, then, we may characterize efforts at merging these two technologies as (i) fuzzification of conventional CNN architectures and models; and (ii) the use of CNNs as tools in fuzzy models. A large portion of the work described at FUZZ-IEEE '92 addressed one or more of these issues.

While the final tallies are not yet available, some preliminary data is. There were just over 500 registrants at FUZZ-IEEE '92, which is about 150 more than the largest conferences (the International Fuzzy Systems Association (IFSA) meetings) devoted to fuzzy systems have ever had in attendance prior to this meeting. A majority of attendees



Jim Bezdek and Lotfi Zadeh at FUZZ-IEEE '92

were affiliated with American industry, as opposed to the more usual representation of academics that are found at fuzzy sets meetings. This speaks well for the timing of the IEEE, which represents, in the main, engineering systems design and developers.

It was clear from the exhibits that hardware, software, and related technologies based on fuzzy logic are maturing rapidly. This conference is most certainly an harbinger of much larger meetings on this topic in the near future. Indeed, next year's conference (FUZZ-IEEE '93) will be held in San Francisco March 28-April 1, 1993, and will be the IEEE's first attempt at holding two major international conferences collocated in both time and space, because the 1993 IEEE International Conference on Neural Networks (ICNN) will be held simultaneously with FUZZ-IEEE '93.

There were a number of other activities associated with this meeting that were a direct result of NNC sponsorship. For example, 19 full and brief papers that were presented at the conference will be published in a special issue of the *IEEE Transactions on Neural Networks* entitled "Fuzzy Logic and Neural Networks in Pattern Recognition and Control"

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Figure 23: FUZZ-IEEE report [1]. (Continued in Figure 24.)

FUZZ-IEEE '92 (cont.)

which will appear in September, 1992. All of these papers were orally presented at the conference in San Diego, but by explicit design and arrangement, none of them were published in the proceedings, even in abbreviated form (the program of the conference gave the forthcoming special issue as a reference for these talks). Every paper in this issue thus had the benefit of full and complete refereeing.

In view of recent developments in the commercial arena, the IEEE in general and the NNC in particular should be congratulated on their vision for recognizing the timeliness of a special issue that contained papers on fuzzy sets methods, CNN methods, and the integration of the two.

A second activity arising from and tied to these events concerns a new flagship journal sponsored by the NNC, namely, the *IEEE Transactions on Fuzzy Systems*, which is scheduled to begin in January, 1993. The NNC felt that a special issue of TNN devoted to synthesis of fuzzy logic and CNNs would be a useful way to introduce readers of TNN to some of the many currents of cross

fertilization between the two fields that are presently afoot. Indeed, this issue of TNN will reach readers just a few months before the inauguration of the *IEEE Transactions on Fuzzy Systems*.

Another activity coordinated with FUZZ-IEEE was NNC sponsorship of an IEEE Press milestone papers book entitled *Fuzzy Models for Pattern Recognition*, edited by J.C. Bezdek and S. K. Pal. This book collects 51 key papers that trace the evolution of fuzzy pattern recognition from Zadeh's original paper to the present. The last chapter concerns itself with the integration of fuzzy logic with computational neural networks, a topic much in evidence at FUZZ-IEEE '92. This book was released for sale at FUZZ-IEEE '92.

All in all, the conference and activities associated with it have been hectic, exciting and rewarding. I think I can speak for the entire fuzzy community in saying that we welcome further opportunities to interact with the NNC and its constituents.

--JCB 4-11-92

Figure 24: FUZZ-IEEE report [1]. (Continued from Figure 23.)

- ▶ The following NNC Neural Network Pioneer Awards recipients are approved: Amari, Freeman and Shun-Ichi Amari, Walter Freeman and David Willshaw.
 - ▶ The name of *The IEEE World Congress on Intelligent Systems* is changed to *The IEEE World Congress on Computational Intelligence*.
 - ▶ Six video tutorials on Fuzzy Logic (Mohamed A. El-Sharkawi, Video Tutorials Chair) becomes the best selling video course in the history of the IEEE Educational Activities Board. (See Figure 29.)
 - ▶ The IEEE Power Engineering Society and the IEEE Computer Society become members of the NNC.
- September 1992: Both the IEEE TFS and TEC have preamble issues in the IEEE TNN by their respective EIC's. James C. Bezdek is the Guest Editor of the IEEE TNN this month of a special issue of fuzzy systems. Bezdek would later be the inaugural EIC of the TFS in 1993. (See Figure 30.)

PRESIDENT'S MESSAGE: INNS and IEEE: an end to an era

Russell C. Eberhart
Research Triangle Institute
IEEE Neural Networks Council President



Many of you have undoubtedly heard about the disagreements between the IEEE Neural Networks Council (NNC) and the International Neural Network Society (INNS). The two organizations have been co-sponsoring the International Joint Conferences on Neural Networks (IJCNNs) for the past few years. The Baltimore IJCNN will be the last IJCNN to be held under this agreement.

I assure you that both the Chinese Neural Networks Council and the IEEE NNC are irrevocably dedicated to making the November 1992 Beijing neural networks conference an immense success. Over 400 papers have already been accepted from within China. Contributions from outside China continue to pour in. We hope you are able to participate in this important and exciting meeting. Please note that the deadline for submission of papers has been extended until May 31, 1992, and that a call for papers appears in this issue of *CoNNections*.

Starting in 1993, the IEEE conference will be called, as it was in 1987 and 1988, the IEEE International Conference on Neural Networks (ICNN). The first of the rejuvenated ICNNs will be held in San Francisco in conjunction with FUZZ-IEEE '93, in late March. A call for papers for these combined meetings is elsewhere in this newsletter.

What prompted the IEEE NNC to cancel the agreement with the INNS? There have been many rumors circulating as to the reason. In order not to fuel the fire, the

NNC, until now, has chosen not to respond to public correspondence generated by the INNS on this matter. We remain friends and colleagues with the INNS volunteers. Many IEEE members are INNS members and visa versa.

The point has been reached, however, where some of these issues need to be aired. After reading this column, I hope you better understand the difficulties that the Council has encountered in dealing with the INNS and the reason we have chosen to no longer work with them under a "blanket" agreement. I also hope that this is the last time that this issue needs to be addressed in *CoNNections*.

At its recent meeting in San Diego, the NNC Administrative Committee (AdCom), consisting of a quorum of four elected officers and two representatives from each of the twelve IEEE member Societies of the NNC (a list of Societies appears on the front page of this newsletter) felt it necessary to terminate the NNC agreement with the INNS concerning IJCNNs. A motion to support the letter reproduced at the end of this President's Message was passed unanimously. Indeed, approval was by acclamation. The vote was based on the cumulative history of the NNC's difficulty in working with INNS.

NNC volunteers, for example, have found it extremely difficult, if not impossible, to communicate with their INNS volunteer counterparts. Following are a few of the more recent incidents:

First, because of his position as a manager of Federal neural network research funding, the INNS President has declared a conflict of interest with members of the IEEE AdCom. Consequently, the Presidents of the IEEE NNC and INNS cannot communicate directly. When communication breaks down, conflict often results.

The INNS currently communicates with the NNC primarily through the INNS Executive Director and INNS General Counsel.

Both are salaried employees of the INNS and trained as lawyers.

The INNS Executive Director apparently also guides policy for the INNS. Last year, NNC volunteers were informed by the INNS Executive Director that they were prohibited from interaction with INNS volunteers. The reason given was that litigation was allegedly threatened by the NNC on an INNS volunteer. The NNC has NEVER considered suing anyone and has never even referred any of the matters to IEEE legal staff! The NNC considered the INNS Executive Director's edict against interaction among our fellow neural network colleagues unacceptable, and chose to ignore it.

More recently, INNS issued a written threat of litigation against the IEEE Neural Networks Council, myself personally, all other agents of the IEEE, the Baltimore IJCNN conference management services, and all of the Baltimore IJCNN volunteers. Although the letter I sent to the INNS (reproduced below) clearly addresses the issue, reasons for this threat included concerns that the 'profit' from the conference would not be appropriately shared.

IEEE, anticipating the effect of such threats on the health of the professional community, indemnifies volunteers against lawsuits brought as a result of their IEEE activities. Such legal bullying can only damage the neural networks volunteer infrastructure. The IEEE NNC categorically refuses to work with any organization using such tactics.

Numerous aspects of the handling of the Beijing conference by the INNS also contributed to the NNC's decision to cancel future joint conferences. Conference arrangements were carried out by the INNS without the participation or knowledge of the Conference Chair. This resulted, despite input from the NNC, in the alienation of the local volunteer organization, and the selection of facilities too expensive to allow participation by our Chinese colleagues. When confronted, rather than comply with

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Figure 25: President's message, May 1992 [9]. (Continued in Figure 26.)

Following is the letter sent to the INNS:

February 26, 1992

Dr. Paul Werbos
President International Neural Network Society
1250 24th Street, N.W.
Suite 600
Washington, D.C. 20037

Dear Dr. Werbos:

It is with regret that I must inform you that, as a result of deviations from agreed commitments by INNS, we consider the IEEE NNC/INNS Agreement terminated effective immediately.

The decision to terminate our agreement was made after extensive discussion of the issues involved within the IEEE Neural Networks Council leadership and consultation with Corporate IEEE.

Specifically, the current issue involves our joint conference that was planned for Beijing China with Professor Zong Sha as its Chairman. INNS failed to accept Professor Sha's authority by not providing him with an approved budget sufficiently in advance of the meeting and interfered with his local arrangements in violation of an agreement signed November 26, 1991 by Professor Zong Sha, Mr. Morgan Downey and Dr. Harold Szu.

Over the recent past, it has become increasingly difficult, if not impossible, for our volunteer leadership to communicate directly with their INNS volunteer counterparts to resolve such issues. We hope that conditions will change and that our organizations will again be able to actively work together for the benefit of our profession.

In accordance with IEEE's commitment to abide by the Agreement while it was in force, and in accordance with the previous budget approval process, any surplus from the Baltimore conference to be held in 1992 will be divided evenly between the IEEE Neural Networks Council and the INNS.

Very truly yours,

Russell C. Eberhart

cc: I. Engelson
E. Herz
J. Powers

The main change is that there is no longer any FINANCIAL arrangement or cooperation between the IEEE NNC and the INNS; rather, each organization interacts independently with the CNNC. The primary effect is that each organization will accept registrations independent of the other. You can thus register via either organization regardless of your membership affiliation(s). The foregoing remarks regarding registration assume that the INNS does choose to participate, which I sincerely hope is the case.

If you have any questions about the Beijing conference, or the Council's relationship with the INNS, please do not hesitate to contact me. I hope that the disagreements between the INNS and the IEEE NNC will soon be put behind us, and that additional columns of this type are not necessary. It will be best for the field, and allow us in the IEEE Neural Networks Council to serve our members better.

I hope to see you in Baltimore and in Beijing!

--RCE 4-11-92

local wishes, the INNS polled its Board of Directors to receive authorization to move the meeting outside China. The NNC finds these actions to be strongly objectionable.

Despite these developments, the Beijing IJCNN will be held in November of 1992 as originally scheduled. An agreement has been crafted by the Chinese Neural Networks Council (CNCC), under the leadership of General Conference Chair Prof. Sha Zong, that defines the roles of the various participants in the meeting. The IEEE NNC has concurred with this agreement. The INNS Program Co-Chair for the Beijing IJCNN supports it, and it is hoped that the INNS Board of Directors will ratify it soon. The conference will be administered, as is IEEE tradition, by local volunteers. The IEEE Beijing Section is a co-sponsor.

IEEE Neural Networks Council Newsletter 4

Figure 26: President's message, May 1992 [9]. (Continued from Figure 25.)

General Chair: **Clifford Lau**
 Honorary Chair: **Bernard Widrow**
 Program Chair: **John J. Shynk**


**CONFERENCE ANNOUNCEMENT
 AND CALL FOR PAPERS**
Papers for oral and poster presentations are solicited. Topics include:

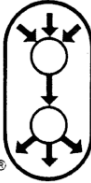
- Applications
- Artificially Intelligent Neural Networks
- Associative Memory
- Electronic Neurocomputers
- Fuzzy Neural Networks
- Image Processing
- Invertebrate Neural Networks
- Machine Vision
- Neurocognition
- Neurodynamics
- Optical Neurocomputers
- Optimization
- Pattern Recognition
- Robotics and Control
- Sensation and Perception
- Sensorimotor Control Systems
- Speech Processing
- Supervised Learning
- Unsupervised Learning

Conference includes **Tutorials, Exhibits, Plenary Sessions, and Social Activities**
 Deadline is January 15, 1992. Six copies of the paper must be submitted, six page maximum, including figures. Papers must be camera-ready on 8 1/2 x 11 white papers, one-column format in Times or similar font style. 10 points or larger with one inch margins on all four sides. Title, author name(s) and affiliation(s) must be on top of the first page followed by abstract. Papers will be printed as submitted. A covering letter must show:


1. Title of paper
2. Name, address and telephone number of corresponding author
3. Your choice of technical session.

Meeting Management
 IJCNN '92 Conference Coordinator
 5665 Oberlin Drive, Suite #110
 San Diego, CA 92121
 Telephone (619) 453-6222
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NEURAL NETWORK
SOCIETY

Figure 27: 1992 IJCNN in Baltimore.

Conference Report**IJCNN92/Baltimore:***The best conference on neural networks ever*

Clifford Lau
Office of Naval Research
General Chair

The 1992 International Joint Conference on Neural Networks (IJCNN) was held at the Baltimore Convention Center on June 7 - 11, 1992. This conference was one of the series of very successful IJCNNs that were co-sponsored by the IEEE Neural Network Council (NNC) and the International Neural Network Society (INNS).

The planning for the conference started two years ago when the IEEE NNC asked me to be the general chair. I was only delighted for such an opportunity, since IJCNN represented the best of all the conferences on neural networks. I was also presented a challenge to do better than past IJCNNs because of the uncertainty in the economy at the time. Throughout the planning process, I have had the most enthusiastic support from the NNC (Dr. Russell Eberhart, President; Dr. Robert Marks, Past President) and from the INNS (Dr. Paul Werbos, President; Dr. Bernard Widrow, Past President). I would like to thank the IEEE NNC and the INNS for giving me the autonomy to organize the conference the way I saw fit. As it turned out, in spite of the recession, the 1992 IJCNN was the best conference on neural networks ever. Preliminary data indicated that more than 1,400 people participated in the conference, from 31 countries.

The conference consisted of a day of tutorials on June 7, when 158 peoples registered for ten different tutorials. The best attended tutorial was the one given by Michael Jordan on New Learning Algorithms. During the four day conference, each day was started by a plenary talk and was followed by four parallel technical sessions. A total of 598 papers, including both oral and poster papers, were presented. This was the

first time that many excellent papers were presented at IJCNN!

Another first for IJCNN was the fact that for the first time in history the conference proceedings were put in the form of a CD ROM. The entire four volumes of the IJCNN'92 Proceedings were put in one CD ROM. This made it much easier to carry around. The CD ROM project was sponsored by the IEEE NNC in collaboration with the IEEE Circuits and Systems Society and the IEEE Engineering in Medicine and Biology Society. Much thanks belonged to Mani Soma of the University of Washington and Stamatios Kartalopoulos of AT&T Bell Laboratories for spearheading the CD ROM effort.

The conference was kicked off on Monday, June 8, by a plenary talk by Professor Stephen Grossberg of Boston University on *Supervised and Unsupervised Learning*. Grossberg, of course, was no stranger to the neural network community and was well known for his work on Adaptive Resonance Theory. The plenary talk on Tuesday was given by Professor Leon Cooper of Brown University on *Synaptic Plasticity in the Visual Cortex: Toward a Molecular Basis for Learning and Memory Storage*. Cooper, in addition to his Nobel Prize on the theoretical understanding of low temperature superconductors, was also well known for his work on the mean field theory for vision processing. On Wednesday morning, the plenary talk was given by Professor Gary Lynch of the University of California at Irvine on the Synaptic Learning Rules: the Causes and Computational Consequences of LTP. Lynch was well known for his work on Long Term Potentiation as a mechanism for synaptic modification. The plenary talk on Thursday

was given by Dr. Jerome Feldman of the International Computer Science Institute on *Natural Computation and Artificial Intelligence*. Feldman was one of the first computer scientists to embrace the connectionist approach to artificial intelligence.

The highlight of the conference was the keynote address on Tuesday night given by Dr. Eugene Wong (Associate Director for Industrial Technology, Executive Office of the President, Office of Science Technology Policy) on High Performance Computing. Dr. Wong was the former Chairman of the Department of Electrical Engineering and Computer Science at the University of California at Berkeley and knew a great deal about neural networks. His talk represented the strong support for high performance computing including neural computing in the Bush Administration.

In addition to and in parallel with the technical sessions, special sessions with invited speakers were also outstanding features of the conference. The talk by Robert Lucky of AT&T Bell Laboratories drew such a crowd that it was standing room only. All the special sessions were well attended. Special thanks should go to the Special Sessions Chair, Dr. Andy Penz of Texas Instruments for organizing such outstanding sessions. In conjunction with the conference, a total of 30 exhibitors displayed their neural network hardware, software, and books at the conference. Credit for the excellent exhibit show belonged to the Exhibits Chair, Dr. Herbert Wang of Rockwell Science Center. The student volunteers were a big part of the conference, and were a major reason the conference ran so smoothly. Many thanks are due to the Volunteers Chair, Nina Kowalski of the

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Figure 28: 1992 Baltimore IJCNN meeting report [19].

**IEEE EDUCATIONAL ACTIVITIES
PRESENTS SIX NEW VIDEOS ON...**

THE THEORY AND APPLICATIONS OF FUZZY LOGIC

*Sponsored by the
IEEE Neural Networks Council*



- **INTRODUCTION TO FUZZY SET THEORY AND FUZZY LOGIC; BASIC CONCEPTS AND STRUCTURES**
By Dr. Enrique Ruspini, SRI International
Product Number: HV0257-6 ISBN: 0-7803-0332-6
- **FUZZY LOGIC; ADVANCED CONCEPTS AND STRUCTURES**
By Dr. Lotfi Zadeh, UC/Berkeley
Product Number: HV0258-4 ISBN: 0-7803-0333-4
- **INFORMATION PROCESSING WITH FUZZY LOGIC**
By Dr. Piero Bonissone, General Electric CR & D
Product Number: HV0259-2 ISBN: 0-7803-0334-2
- **FUZZY LOGIC AND NEURAL NETWORKS FOR CONTROL SYSTEMS**
By Dr. H.R. Berenji, NASA Ames Research Center
Product Number: HV0260-0 ISBN: 0-7803-0335-0
- **FUZZY LOGIC AND NEURAL NETWORKS FOR PATTERN RECOGNITION**
By Prof. James C. Bezdek, University of West Florida
Product Number: HV0261-8 ISBN: 0-7803-0336-9
- **FUZZY LOGIC AND NEURAL NETWORKS FOR COMPUTER VISION**
By Prof. James Keller, University of Missouri
Product Number: HV0262-6 ISBN: 0-7803-0337-7

Each tutorial is accompanied by hardcopy visuals

The Theory and Applications of Fuzzy Logic set (all six tapes, Product number HV0256-8, ISBN 0-7803-0331-8) is IEEE member priced at \$449.95 (\$649.95 non-member). Individual tapes are IEEE member priced at \$89.95 (\$129.00 non-member, plus shipping and handling. OVERSEAS MUST SHIP AIR FREIGHT. CALL FOR CHARGES. For a full description of the programs and complete ordering information, call IEEE today at 1-800-678-IEEE, Telex: 833233, or Fax 908-981-1686.

Or write to: IEEE
Educational Activities Dept.
445 Hoes Lane
PO Box 1331
Piscataway, NJ 08855-1331



Figure 29: NNC sponsored fuzzy videos distributed by the IEEE Educational Activities Board.

Guest Editorial

THIS special issue was commissioned by the IEEE Neural Networks Council (NNC) about 18 months ago in conjunction with their sponsorship of the First IEEE International Conference on Fuzzy Systems (FUZZ-IEEE'92), which was held in San Diego on March 8-12, 1992. Thus, it seems appropriate at this point to first thank the NNC (in particular, Russ Eberhart, Bob Marks, Pat Simpson, and Mike Roth) for their interest, enthusiasm, and support. The issue contains 10 full papers and eight brief papers. Talks on all of these papers were presented at the conference in San Diego, but by explicit design and arrangement, none were published in the proceedings, even in abbreviated form (the program of the conference gave this issue as a reference for these talks). Every paper in this issue thus had the benefit of full and complete refereeing. I mention this simply to point out that these are indeed archival papers, even though they were associated with and derived from the FUZZ-IEEE'92 conference. Thanks are due, of course, to the many referees who helped critique the papers for this issue.

There has been, in the last five years, a large and energetic upswing in research efforts aimed at synthesizing fuzzy logic with computational neural networks (CNN's). There are several reasons for this. First, the enormous success of commercial applications which are at least partially dependent on fuzzy technologies, fielded (in the main) by Japanese companies, has led to a surge of curiosity about the utility of fuzzy logic for scientific and engineering applications. Second, the marriage of fuzzy logic with CNN's has a sound technical basis, because these two approaches generally attack the design of "intelligent" systems from quite different angles. CNN's are essentially low-level, computational algorithms that (sometimes) offer good performance in dealing with sensor data used in pattern recognition and control. On the other hand, fuzzy logic was introduced in 1965 by Lotfi Zadeh as a means for representing, manipulating, and utilizing data and information that possess nonstatistical uncertainty. Thus, fuzzy methods often deal with issues such as reasoning on a higher (semantic or linguistic) level than CNN's. Consequently, the two technologies often complement each other, CNN's supplying the brute force necessary to accommodate and interpret large amounts of sensor data, and fuzzy logic providing a structural framework that utilizes and exploits these low-level results. Third, there seem to be many ways to use either technology as a "tool" within the framework of a model based on the other. For example, the CNN is well known for its ability to represent functions. The basis of every fuzzy model is the membership function. So, a natural application of CNN's in fuzzy models is to provide good approximations to the

membership functions, which are essential to the success of any fuzzy approach.

Broadly speaking, then, we may characterize efforts at merging these two technologies as (i) fuzzification of conventional CNN architectures and models and (ii) the use of CNN's as tools in fuzzy models. In view of recent developments, the IEEE in general and the NNC in particular should be congratulated on their vision for recognizing the timeliness of a special issue containing papers on fuzzy set methods, CNN methods, and the integration of the two. The NNC felt that this issue would be a useful way to introduce readers of the TRANSACTIONS ON NEURAL NETWORKS to some of the many currents of cross-fertilization between the two fields that are presently afoot. Indeed this issue will reach readers of the TRANSACTIONS just a few months before the inauguration of another flagship journal sponsored by the NNC, the IEEE TRANSACTIONS ON FUZZY SYSTEMS, which is scheduled to begin in January 1993. Readers interested in this journal may consult the call for papers about it at the back of this issue.

As to the papers themselves, it is not my intention to account for their contents in this introduction. Several remarks on the overall nature and scope of the issue, however, may be useful to subscribers of the TRANSACTIONS ON NEURAL NETWORKS. There were about 80 papers submitted for this issue, and I tried to constrain the selection to the topics mentioned in the thematic title: *Fuzzy Logic and Neural Networks in Pattern Recognition and Control*. Almost all of the papers contained herein possess contents as advertised. In particular, the full papers are (roughly) grouped into three areas: the first five deal with pattern recognition; the sixth and seventh address the use of CNN's in fuzzy control; and the eighth through the tenth all deal with the use of CNN's in the context of evidence aggregation and approximate reasoning. I think the 10 full papers cover a very representative range of activities on the topics of the issue, both in terms of theory versus applications and across a number of disciplines affected by CNN's and fuzzy logic in both pattern recognition and control. The eight brief papers are a bit more diverse. The first four are oriented toward pattern recognition (classification or clustering); Horikawa's paper fits well with the last group in the set of full papers; and the last three each address a topic that bears on CNN's or fuzzy logic or both, in slightly different contexts. All in all, I am quite satisfied with both the quality and the topical coverage afforded by the articles in this issue. I hope the readers of this journal will concur.

JIM BEZDEK
Guest Editor

Figure 30: Special issue of TNN on fuzzy systems [2].

CALL FOR PAPERS

1992 RNNS/IEEE Symposium on Neuroinformatics and Neurocomputing
Rostov-on-Don, USSR
 Oct 7 - Oct 10, 1992

Jointly sponsored by the IEEE and the Russian Neural Networks Society, This symposium will emphasize the theoretical aspects of Neural Computation as well as the practical issues involved in implementation of those aspects. Topics of particular interest are:

- Natural Neural Systems Informatics
- Neurocomputers perspectives
- Learning in Neural Networks
- Statistical Modeling of Neural Networks
- Sensory Information Processing and Motor Control
- Neurocomputer Hardware
- Neural Information Theory and Coding
- Optimization Techniques

Conference Committee
Symposium Chair: Witall Dunin-Barkowski
International Chair: Robert Marks II
Program co-chairs: Alexander Frolov and Wesley Snyder
Local Committee Chair: Anatoly Kovalyov

Advisory Board:
 Jury Gulyaev, *chair* Eduard Manykin
 Robert Hecht-Nielsen Andrej Mikaeiyan
 Robert Marks II

Program committee:

A. Amit	R. Eckmiller	R. Newcomb	P. Simpson
S. Amari	N. Farhat	A. Petrov	J. Taylor
J. Bezdek	T. Fukuda	L. Podladchikova	S. Thomas
R. Borisyuk	A. Gorban	I. Rybak	A. Vedenov
J. Bower	A. Gutman		V. Yachno
G. Carpenter	M. Ito		
A. Chernavsky	M. Kienin		

Plenary Speakers:
 R. Hecht-Nielsen A. Kalyaev
 M. Ito T. Kohonen

Conference registration will include lodging and meals, including a set of "fresh air sessions" to be held on a tour boat on the lovely Don river.

Manuscripts should be typed, double-spaced, using no less than 11 pt type, with a maximum length of 12 pages, and must be received by Dec. 31, 1991. Manuscripts not adhering to format restrictions will not be reviewed. Authors will be notified of acceptance by March 1, 1992, and will have 30 days to submit camera-ready copy. Because of anticipated difficulties in communication, poster papers are strongly encouraged, and authors are requested to indicate their preference of poster or oral presentation. Poster submissions will be reviewed to as high or higher standard than oral presentations. Authors outside the USSR should submit papers to **Prof. Wesley E. Snyder** Department of Radiology Bowman Gray School of Medicine Winston-Salem, NC 27157-1022 USA. Authors within the USSR should submit papers to **Prof. Alexandre A. Frolov** 5a Butlerov St. Institute for Higher Nervous Activity and Neurophysiology 117 485 Moscow USSR

Figure 31: RNNS/IEEE Symposium on Neuroinformatics, CFP

- October 7-10: The RNNS/IEEE Symposium on Neuroinformatics is held in Rostov-on-Don, Russia. (See Figures 31 and 32.)

The former USSR is officially dissolved in December 1991 and splinters into fifteen independent republics. Boris Yeltsin is elected the President of Russia in June 1991 in the first direct presidential election in Russian history. It is within this framework that the RNNS/IEEE Symposium on Neuroinformatics is held less than a year later in Russia.

- ▶ The conference is jointly sponsored by the Russian Neural Network Society (RNNS)
- ▶ The conference committee includes:
 - Witall Dunin-Barkowski (A.B. Kogan Research Institute for Neurocybernetics, now with Texas Tech University), Chair,
 - Robert J. Marks II, International Chair,
 - Alexander Frolov and Wesley Snyder, Program Co-Chairs.
- ▶ A meeting report by Program Co-Chair Wesley Snyder is in Figure 33 [41].
- November 3-6: The IJCNN is held in Beijing. (See Figures 35.) Only twenty years earlier, US President Richard Nixon made his historic visit

The RNNS/IEEE Symposium on

Neuroinformatics and Neurocomputers

Rostov-on-Don, Russia

October 7-10, 1992



РОСТОВ-на-ДОНУ



RNNS
RUSSIAN
NEURAL NETWORKS
SOCIETY

Figure 32: RNNS/IEEE Symposium on Neuroinformatics, Proceedings Cover

“From Russia ...With Hope”

Wesley E. Snyder

Wake Forest University Bowman Gray School of Medicine
Newsletter Editor

In October, I had the pleasure of being the program chair for the first (hopefully of many) Joint Symposium on Neuroinformatics and Neurocomputers, sponsored by the IEEE Neural Networks Council and the Russian Neural Networks Society. The conference was held in Rostov-on-Don, Russia, a lovely city on the shores of the Don River, about 1000 km south of Moscow.

Our travel was amazingly uneventful — the customs official didn't even blink at my three large boxes of proceedings, and the ride on Aeroflot from Moscow to Rostov was smooth and on time.

The technical content of the conference was outstanding! The conventional wisdom that the Russians are excellent mathematicians but don't have access to good computing equipment is more-or-less correct. I consider it a good conference when I hear one excellent paper, with results which I find exciting. In this conference, I heard four such papers! All the presentations were in English, and for the most part, I had no difficulty in following the pronunciations.

Congratulations and thanks are due to many people: Witali Dunin-Barkowski, the general chair, and his colleagues in Russia; Bob Marks, former NNC president and current editor of the *Transactions on Neural Networks*; who was international chair; Dmitry Kaplan of the University of Washington who handled the (very complicated) finances of the conference, and doubled as translator and guide for Bob and me; all those who served on the program committee and reviewed papers; and my secretary, Carla Stout, who put in a lot of hours at a very busy time.

As far as life in Russia is concerned, I came away from the trip with a great sense of confidence and optimism. Life is going to be hard for the Russians, but I feel that they

will persevere, and come up with a successful economy and democratic form of government. I also came away with a sense of anger at what 50 years of communism has done to an intelligent, congenial, and sensitive people.

Even though Carl Marx supported the “labor theory of value”, the current system has NO theory of value. If you ask how much something costs, the response you may get is “how much would you like it to cost?” — remember, prices and costs have been uncorrelated for 50 years. They also have no legal system to deal with the potential abuses of a free market system. The average man-on-the-street knows what a monopoly is (I assume they study it in school), but the more subtle forms of monopoly, e.g. price fixing, are not well understood and not incorporated into the legal system.

Russian entrepreneurs, however, are starting to figure out these concepts, and in the absence of appropriate laws and enforcement, to take advantage of these opportunities. I heard much about the “Russian mafia” in this context, and was unable to distinguish between activities which were illegal and those that were unethical (of course, maybe we

Westerners shouldn't make that distinction either).

I remember as a schoolboy in the fifties practicing for what to do in the event of nuclear attack -- sit on the floor beside my desk, away from the window, put my head between my knees-- etc, in case the “Godless Russians” attacked. And symmetrically, I am sure the Russians had their drills in case the “Imperialistic Americans” attacked. After growing up in such a world, to walk across Red Square, to stroll the grounds and visit the churches of the Moscow Kremlin, and to have frank and open technical discussions with Russian scientists was the thrill of a lifetime. The trip would have been great even without the conference; and the success of the conference made it that much better.

The proceedings will be available from the IEEE or, at least for the moment, the conference still has a few copies left for sale. Send Email to carla@relitio.medeng.wfu.edu if you are interested.



Witali Dunin-Barkowski, Director of the A. B. Kogan Research Institute for Neurocybernetics at Rostov State University, Rostov-on-Don, Russia; Dmitry Kaplan, Wesley Snyder, Bob Marks, and Boris M. Vladimirov, deputy director of the Kogan Institute.

December 1992 4

Figure 33: Report about RNNs/IEEE Symposium on Neuroinformatics, Rostov-on-Don, Russia [41].



Figure 34: Beijing IJCNN. Robert J. Marks II is in front of the sign.

to the People's Republic of China. In the west, China had remained mysterious and unknown since the revolution in the late 1940's. The 1990's are historically considered to be the beginning of economic growth and openness in China. We like to think that the Beijing IJCNN was part of this opening process.

► Conference Committee

- Zong Sha (Organizing Chair),
- Wu You Shou (General Chair),
- Russ Eberhart and S.I. Amari, (General co-Chairs),
- Zhong Yi Xin (Program Chair),
- Harold Szu (Program co-Chair)
- Robert Newcomb (University of Maryland) (Program co-Chair).

- There are 850 participants, 600 from China. 563 papers were presented at the conference [46].
- Russell Eberhart, the NNC President, gives a conference report. See Figures 36 and 37.

- December 5-6: An NNC AdCom Meeting is held in Scottsdale.

1993

- Teuvo Kohonen (Helsinki University of Technology, Finland) becomes the first IEEE NNC Fellow.
- January 12, 1993: A US Trademark is issued for NNC logo. (See Fig 38).
- February: The first issue of the IEEE TRANSACTIONS ON FUZZY SYSTEMS (TFS) appears. James C. Bezdek is the Editor-in-Chief.

IJCNN'92
Beijing

1992 International Joint Conference on Neural Networks

Beijing, China
November 3-6, 1992




General Chair
Dr. Zong Sha
Chinese Institute of Electronics
Beijing, China

Sponsored by:
The IEEE Council on Neural Networks
The International Neural Network Society
The China Neural Networks Council
The IEEE Beijing Section

The International Joint Conference on Neural Networks (IJCNN '92-Beijing) will be held November 3-6, 1992 (Tutorials on November 1-2), in Beijing, China. This conference is intended to provide a forum for dissemination of the latest scientific and technical information in the various fields of Neural Networks.

Conference Co-Chairs
You Shou Wu, Tsinghua University, China
Shun-ichi Amari, Tokyo University, Japan
Russell C. Eberhart, Research Triangle Institute, USA

Program Co-Chairs
Yi In Zhong, University of Posts & Telecom., China
Harold Szu, INNS, USA

Organizing Co-Chairs:
Zong Sha, Chinese Institute of Electronics, China
Shiro Usui, Toyohashi University of Technology, Japan

International Advisory Co-Chairs:
Paul Werbos, National Science Foundation
Robert Marks II, University of Washington, USA

International Advisory Members:
Stephen Grossberg, Boston University
Teuvo Kohonen, Helsinki University
Bernard Widrow, Stanford University
Kunihiko Fukushima, Osaka University

General Information: For further details you may write or fax:

<p><i>(In China)</i> Prof. Yi Zin Zhong IJCNN '92 Beijing Beijing Univ. of Posts & Telecom. Beijing 100088, China Tel: 201-3388 ext. 2203 Telex: 210431 CIE CN Fax: 500-5233 <i>(Outside China)</i> Dr. Russell C. Eberhart, Director Biomedical Engineering Research Triangle Institute PO Box 12194 Research Triangle Park NC</p>	<p>27709 USA Tel: 919-541-7123 Fax: 919-541-8746 E-mail: rce@rii.ni.org or Dr. Harold Szu INNS President Elect 9402 Wiloak Dr. Bethesda MD 20814 Tel: 301-394-3097 Fax: 301-394-3923 E-mail btelfe@ulysses.nswc.navy.mil</p>
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Figure 35: Beijing IJCNN CFP

- The IEEE Social Implications of Technology Society becomes a member of the NNC [11].
- IEEE TNN
 - ▶ The Best Paper Award for IEEE TNN is given to R.M. Sanner and J-J.E. Slotine [39].
 - ▶ 1500 papers have been submitted to the TNN thus far [25].
 - ▶ The print run for each TNN issue is 9650 copies. About 1000 of these go to libraries [25].
- Patent activity in neural networks and fuzzy systems accelerates. See Figure 39 [24].
- March 27, 1993. The NNC AdCom meets in San Francisco.
 - ▶ Mohamed El-Sharkawi, NNC Video Committee Chair, reports there are 358 NNC videos from **The Theory and Applications of Fuzzy Logic** sold NNC Video Sales as of December 31, 1992. (See Figure 29.) Here are the speakers.

President's Message

*Russell C. Eberhart
Research Triangle Institute*



I just returned from the IJCNN '92 Beijing. The conference was a great success. My special thanks go to Prof. Sha Zong for being responsible for the overall conference arrangements. The banquet, with its sumptuous 14-course dinner and traditional Chinese music and theatrical performances, was especially memorable.

Thanks also go to Conference Co-Chairmen Profs. Wu You Shou and Shun-Ichi Amari, and the Program Co-Chairmen Prof. Zhong Yi Xin and Dr. Harold Szu. The technical papers and posters were of high quality. It is noteworthy that much discussion occurred in the question-and-answer periods after the paper presentations. I have never seen as much "give and take" at an IJCNN—

and all despite potential language barriers.

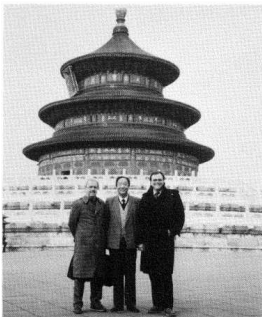
Special thanks also go to Mary Lou Padgett, who chaired a session on standards. Finally, thanks are due to the man "behind the scenes", Mr. Zhou Mengqi, Secretary of the IEEE Beijing Section, who helped with numerous arrangements, and made my time in Beijing easier and more pleasant.

At the banquet, International Cooperation Awards were presented by the Chinese Neural Network Society to Prof. Sha Zong, Prof. Shun-Ichi Amari, Dr. Harold Szu, and to me. As I stated at the banquet, Prof. Sha certainly deserves the award more than I. It was Prof. Sha who contacted Dr. Irv Engelson at IEEE Headquarters in late 1990 and suggested that the NNC send a representative to China to participate in the First Annual Chinese National Neural Networks Conference. I also believe that I share the award with many people in the NNC who "kept the faith" and worked hard to make the conference a reality, such as Prof. Robert Marks, who has consistently helped with international activities, and Prof. Robert Newcomb, whose team quickly and professionally reviewed all papers from outside P. R. China submitted to the IEEE.

During the Beijing IJCNN, there was discussion of the formation of an Asian Neural Networks Association. One of the purposes of the association, as I understand it, would be to coordinate conferences and other activities in the Pacific Rim area. I heartily endorse such an organization. The IEEE, through its sections and NNC Regional Interest Groups in Asia, stands ready to support the association's activities. I have some concerns, however, that are reflected by the words "in Asia" and "support" in the previous sentence. I strongly believe that, to be effective, an Asian association must be organized and run by Asians. It is important that non-Asians not try to control (or even "guide") the formation or activities of the association. At the Council level, we are committed to being responsive to our constituents, which include IEEE Sections and NNC Regional Interest Groups.

We are now looking forward to our next conferences: the International Conference on Neural Networks, and FUZZ-IEEE '93, to be held concurrently in San Francisco in late March, 1993. Dr. Enrique Ruspini, the General Chairman, is heading an organization that will, I'm sure, carry on the tradition of excellence.

Figure 36: Beijing IJNN conference report [10].



Russ Eberhart, Zong Sha, Chairman of IJCNN Beijing, and Bob Marks



Figure 37: LEFT: Beijing IJNN photo from CONNECTIONS [26]. RIGHT: NNC President Russell C. Eberhart, Beijing IJCNN Chair Zong Sha, and Monika Marks.

Int. Cl.: 41

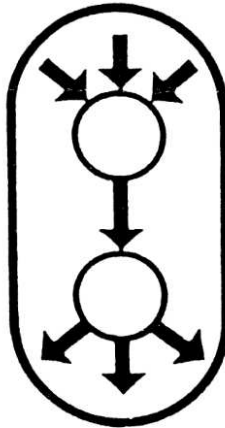
Prior U.S. Cl.: 107

United States Patent and Trademark Office

Reg. No. 1,746,129

Registered Jan. 12, 1993

**SERVICE MARK
PRINCIPAL REGISTER**



INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, THE (NEW YORK CORPORATION)
345 EAST 47TH STREET
NEW YORK, NY 10017

OF NEURAL NETWORKS, IN CLASS 41 (U.S. CL. 107).

FIRST USE 12-0-1986; IN COMMERCE 12-0-1986.

SER. NO. 74-202,852, FILED 9-11-1991.

FOR: EDUCATIONAL SERVICES; NAMELY, CONDUCTING CONFERENCES IN THE FIELD

AMOS T. MATTHEWS, JR., EXAMINING ATTORNEY

Figure 38: Trademark for NNC Logo.

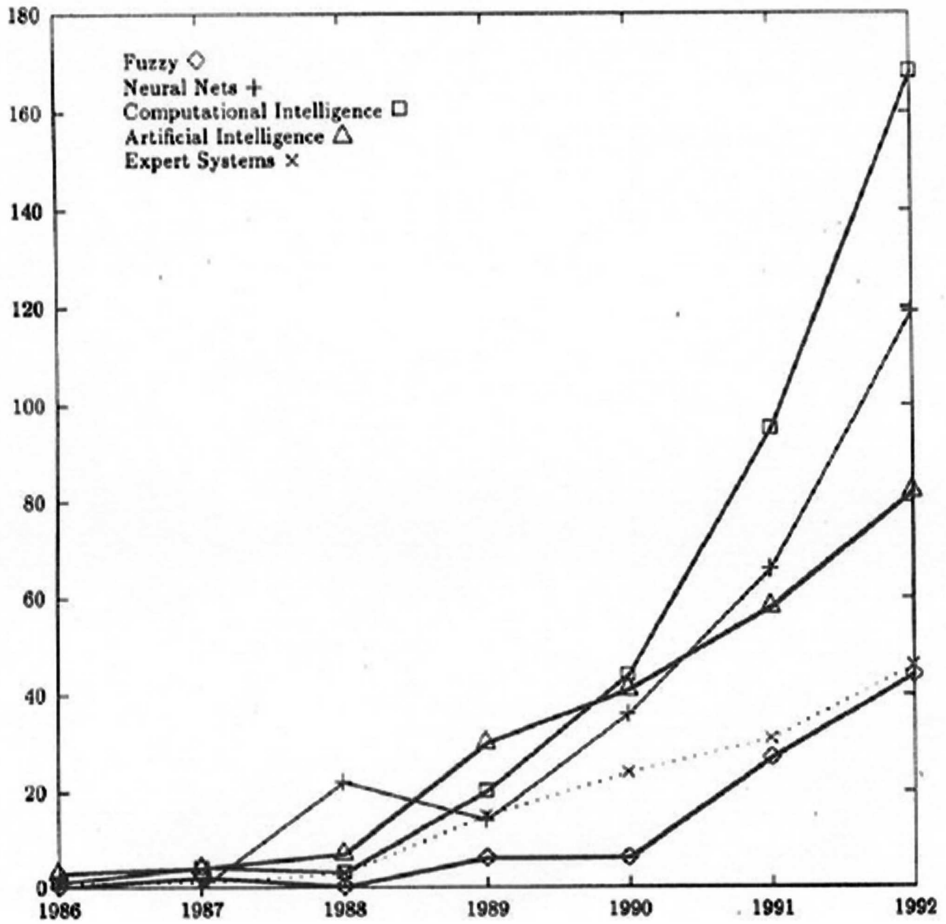


Figure 39: Patent activity from the CASSIS data base [24].

1. Enrique Ruspini (SRI International). Introduction to Fuzzy Set Theory and Fuzzy Logic: Basic Concepts and Structures.
 2. Lotfi Zadeh, Fuzzy Logic: Advanced Concepts and Structures.
 3. Piero Bonissone, Information Processing With Fuzzy Logic.
 4. Hamid R. Berenji (NASA Ames Research Center), Fuzzy Logic and Neural Networks for Control Systems
 5. James C. Bezdek, Fuzzy Logic and Neural Networks for Pattern Recognition
 6. James Keller (University of Missouri, Columbia), Fuzzy Logic and Neural Networks for Computer Vision.
- March 28-April 1, 1993: Second FUZZ-IEEE joint with ICNN is held in San Francisco. (A conference report by the conference's General Chair is in Figures 40 and 41.)
- ▶ Conference Committee
 - Enrique H. Ruspini, General Chair for both conferences.
 - Piero P. Bonissone, Program Chair for FUZZ-IEEE
 - Hamid Berenji, Elie Sanchez and Shiro Usui, Program Chairs for ICNN.
 - ▶ 526 papers are submitted to ICNN and 350 to FUZZ-IEEE. About 1250 attend.
 - ▶ The first open IEEE NNC Standard Committee meeting is held.
 - ▶ This is the first NNC conference to have a separate Video Proceedings.
- June 1993: IEEE NNC Forum on Virtual Reality and Persons With Disabilities.
- ▶ Cosponsored with UC Northridge.
 - ▶ Harry Murphy is the General Chair.
- **Claptrap Versus a Cult of Analyticity.** The use of neural networks and fuzzy logic remains controversial [30]. In the June issue of IEEE Control Magazine, we read [3]:

“The image that is portrayed is of the ability to perform magically well by the incorporation of ‘new age’ technologies of fuzzy logic, neural networks... approximate reasoning, and self organization in the face of dismal failure of traditional methods. This is pure unsupported claptrap which is pretentious and idolatrous in the extreme, and has no place in the scientific literature.”

E.M. Mamdani, the father of fuzzy control, counters [21]

**1993 IEEE International Conference on Neural Networks (ICNN'93)
Second IEEE International Conference on Fuzzy Systems (FUZZ-IEEE'93)**

Enrico H. Ruspini
General Chair, ICNN'93 and FUZZ-IEEE'93

A pioneer combination of the largest technical conferences in the world devoted to fuzzy systems and neural networks.

In recent years, concepts and methods from the fields of fuzzy systems and neural networks have been increasingly used in combination to develop new system modeling and analysis techniques and to understand and control a variety of real-world systems. Neural network techniques, for example, have proven to be extremely useful to refine and adjust the possibility distributions that define fuzzy controllers and fuzzy signal processors. Conversely, ideas from fuzzy logic have been used to generalize the architecture and learning rules of neural networks systems. The increasing number of technological connections between the fields has manifested itself in numerous technical contributions that bridge both disciplines. For example, approximately 20% of the papers presented at the First International Confer-

ence on Fuzzy Systems were concerned with combinations of fuzzy logic and neural networks concepts and techniques.

The evolving symbiosis of these new technologies and the realization that advances in the two fields are increasingly intertwined motivated the joint, concurrent meeting of two major technical forums: the 1993 IEEE International Conference on Neural Networks (ICNN'93) and the Second IEEE International Conference on Fuzzy Systems (FUZZ-IEEE'93).

San Francisco, California was the venue, from March 28 to April 1, 1993 of these two major meetings sponsored by the IEEE Neural Networks Council. The format chosen for this combined event allowed participants to either conference to attend all functions and programs of both conferences. Over 1200 participants were able to attend a rich program of tutorials, exhibits, technical sessions, social functions and tours.



Enrique H. Ruspini is with the Artificial Intelligence Center, SRI International

The technical programs prepared by the Program Chair of FUZZ-IEEE'93, **Dr. Piero P. Bonissone**, and by the Program Cochairs of ICNN'93, **Dr. Hamid Berenji**, **Professor Elie Sanchez**, and **Professor Shiro Usui**, were especially designed to foster interdisciplinary communication while maintaining the individual character of each conference.

The plenary session program, for example, included two joint sessions, or "superplenaries" featuring talks by Professors **Lotfi A. Zadeh**, **Bernard Widrow**, **Carver Mead**, and **Teuvo Kohonen**. Plenary sessions of ICNN'93 included talks by **Dr. Piero Bonissone**, **Dr. Richard Sutton**, **Professor Kumpati Narendra**, and **Professor John Koza** while plenary sessions of FUZZ-IEEE'93 included talks by **Professor E. Mamdani**, **Professor Michio Sugeno**, **Dr. Hamid Berenji**, and Professors **Didier Dubois** and **Henri Prade**. Two of these plenary talks (by **Dr. Bonissone** and **Dr. Berenji**) were specially prepared to introduce each community to significant concepts and advances of the other

•Tutorials

The tutorial program of the joint meeting, organized by **Professor James Bezdek**, also emphasized interdisciplinary themes, ranging from applications



Hard-working AdCom members labor under the gaze of Jack London and Mark Twain

Figure 40: 1993 ICNN/FUZZ-IEEE conference report [37]. (Continued in Figure 41.)

of fuzzy logic and neural networks to control systems, computer vision, and pattern recognition to discussions of approaches based on combination of genetic algorithms and neural networks and of expert systems and neural networks. Other tutorials included presentations on basic concepts of fuzzy set theory, neural networks, and evolutionary programming; hardware approaches to fuzzy logic; applications of fuzzy logic to databases and neural networks; and—in keeping with the multidisciplinary orientation of the event—on the role of cognitive-science concepts in neural networks applications.

The technical session program for both conferences included more than 600 contributions, of which approximately 350 were presented as part of ICNN'93 and 250 as part of FUZZ-IEEE'93. Invited sessions were organized on a variety of topics ranging from reinforcement learning and recurrent neural networks to various aspects of fuzzy reasoning and its applications. A significant number of participants attended sessions dealing with genetic algorithms and industrial applications of fuzzy logic, which, I am happy to report, will figure prominently in future NNC-sponsored meetings.

The organizing committee was particularly pleased with the response of participants to sessions dealing with interdisciplinary subjects such as the role of biological evolution in computation and various aspects of the symbiotic relation between fuzzy logic and neural networks.

•Exhibits

Nearly 30 exhibitors participated in the joint Exhibits program displaying a variety of products and services ranging

from books and software systems to various forms of hardware. "Flakey", an autonomous mobile robot developed by SRI International that uses a fuzzy controller, thoroughly and consistently roamed the exhibition floor during coffee breaks, sometimes sporting ICNN'93 and FUZZ-IEEE'93 T-shirts.

•Electronic Proceedings

Both ICNN'93 and FUZZ-IEEE'93 followed in the pioneering footsteps of IJCNN'92 by producing CD-ROM versions of the Conference Records. These CD-ROM Proceedings, which were produced by Young Minds, Inc. of Redlands, California, may be accessed using a proprietary software package (ViewTool) that supports a wide variety of hardware platforms ranging from personal computers to a variety of engineering workstations.

•Practitioner's Workshops

An innovation, introduced in the context of FUZZ-IEEE'93, was the inclusion, as a complement to the technical program, of "Practitioner's Workshops." Practitioner's workshops are informal gatherings intended to describe significant case histories and experiences in the application of a particular technology. The objective of practitioners' workshops is to provide newcomers to the field with significant information about the problems faced by those who successfully accomplished the technological transfer of theoretical ideas into actual commercial and industrial products. The pilot practitioners' workshop for FUZZ-IEEE'93 was organized by Dr. Earl Cox on the topic of commercial and business applications of fuzzy logic.

•Video Proceedings

Also appearing for the first time in an NNC-sponsored conference was the first of a planned series of Video Proceedings, which was jointly produced by the NNC and the IEEE Educational Activities Board. Video Proceedings are collections of video segments showing significant research advances that cannot be easily conveyed in other formats. For this initial edition of a joint ICNN/FUZZ-IEEE'93 Video Proceedings, **Aviv Bergman**, of Interval Research Corporation, and I solicited a number of contributions from leading researchers in the fields of fuzzy logic and neural networks. These clips were edited and combined with narrative explanations about each contributed segment, and, more generally, about the nature of each discipline and its major problems. The result, produced with the assistance of the Stanford Instructional Television Network, is a new IEEE video entitled "Fuzzy Logic and Neural Networks: Clips from the Field."

The positive participant response to ICNN'93 and FUZZ-IEEE'93 expressed through personal comments and written evaluations are most reassuring indications of the timeliness and value of such a joint meeting and are a most appreciated reward for the efforts devoted by the IEEE volunteers who planned and organized these conferences.

In closing, I would like to thank the Program Chairs of both conferences; **Richard Tong**, who promptly and diligently took care of our finances; **Wei Xu**, who organized and promoted the Exhibits Program; **Cameron Welch**, who handled press and public relations; **Andy Worth**, who coordinated volunteer activities; **Aviv Bergman**, who chaired the Video Proceedings effort; **Alessandro Saffiotti**, who provided valuable real-time assistance and participated in the video effort; **Jim Bezdek**, for his confidence and for the organization of the tutorial program, and to all members of the Program and Organizing Committees, who made the San Francisco conferences such a big success. Special thanks also go to **Nomi Feldman** and her team at Meeting Management for their skillful organizational support. Finally, all of us involved in ICNN'93 and FUZZ-IEEE'93 are most grateful to **Russ Eberhart**, **Bob Marks**, and the Neural Networks Council for their confidence and unwavering support.



Renowned juggler Toshio Fukuda and fellow performers

Figure 41: 1993 ICNN joint with FUZZ-IEEE conference report [37]. (Continued from Figure 40.)

“[Such attitudes are due to] the traditional intellectualism in engineering in general and the cult of analyticity within control system engineering research in particular.”

As is the case for many arguments in engineering, the dispute has been settled by reduction to practice.

- Special issue of IEEE TNN on Evolutionary Computing, David B. Fogel and Lawrence J. Fogel, Guest Editors. (See Figure 42.)
 - ▶ A special issue of the IEEE TNN one year earlier (September 1992) on Fuzzy Systems by James C. Bezdek proved an introduction to the IEEE TFS, also edited by Bezdek, that premiered in 1993.
 - ▶ This special issue was a precursor the IEEE TEC, edited by David Fogel, that debuted in 1997.

- September 18-22: The *IEEE Virtual Reality Annual International Symposium* (VRAIS) is held in Seattle.
 - ▶ Conference Committee
 - Thomas Furness (University of Washington), Chair
 - Robert J. Marks II, Organization Chair
 - Michitaki Hirose (University of Tokyo) and Thomas Caudell (Boeing Airplane Company, now with the University of New Mexico), Technical Program Chairs
 - Masachiro Kawahata (Fujitsu Research) and Toshio Fukuda, International Liaisons
 - ▶ The attendance is 489.
 - ▶ The VRAIS conference report by Thomas Caudell, Technical Program Co-Chair, is in Figure 43 and Figure 44 [4].
 - ▶ *Vrais* is French for “truth.” The acronym is coined by Payman Arabshahi (JPL Cal Tech and now with Applied Physics Lab, University of Washington).
 - ▶ The NNC sponsors virtual reality video tutorials. (See Figure 45.)

- September 18: The NNC AdCom meets in Seattle.
 - ▶ The officers elected for 1993 are:
 1. Patrick K. Simpson, President,
 2. Walter Karplus, Vice President,
 3. Piero P. Bonissone (General Electric), Treasurer, and
 4. Stamatios V. Kartalopoulos, Secretary.

- October 25-29: The IJCNN is held in Nagoya, Japan. (See Figure 46 for CFP and Figure 47 for the conference report by steering committee member, Takanori Shibata (Nagoya University).)

Call for Papers

Special Issue on Evolutionary Programming in the

IEEE TRANSACTIONS ON NEURAL NETWORKS

Evolutionary programming is a stochastic optimization technique that can be used to address various optimization problems. Papers regarding the theory and application of evolutionary programming to complex problem solving in intelligent systems are solicited. Topics include, but are not limited to, automatic control, neural network training and design, system identification, adaptive representation, forecasting, robotics, combinatorial optimization, pattern recognition, and the relationship between evolutionary programming and other optimization methods. On or before December 15, 1992, prospective authors should submit six (6) copies of the completed paper to the guest editors:

David B. Fogel
Lawrence J. Fogel
ORINCON Corporation
9363 Towne Centre Dr.
San Diego, CA 92121

Authors will be notified of the reviewers' decision on or before March 31, 1993. Accepted papers will appear in the September 1993 issue of the TRANSACTIONS.

Figure 42: Call for papers for a special issue of IEEE TNN on evolutionary computing. The IEEE TEC premiers in 1997.



Who are these people? See *VRAIS '93*, p. 5

VRAIS 1993

The first IEEE Virtual Reality Annual International Symposium was held in Seattle Washington from September 18 through 22. This conference was sponsored by the Virtual Reality Technical Committee of the IEEE Neural Networks Council, in cooperation with the SPIE, the International Society for Optical Engineering, the IEEE Industrial Electronics Society, Lasers and Electro Optics Society, Robotics and Automation Society, Information Theory Society, Oceanic Engineering Society, Signal Processing Society, and the IEEE Seattle Section.

The conference was a big success, with a total of 477 registered attendees representing over 18 countries—nearly twice the expected attendance. Thanks are due to the efforts of Publicity Chair Rich Donnelly of the SPIE, Press Relations Chair Alden Jones of the University of Washington, and the rest of the Organizing Committee.

The two days of tutorials that preceded the technical conference were organized by Blake Hannaford of the University of Washington. Almost every class was packed to capacity and sold out to standing room only crowds. The general comment from tutorial-goers was “give me more”! This is a rapidly changing field that has yet to completely define itself. The tutorial sessions offered topics that ranged from introductory to advanced, covering subjects such as

Figure 43: 1994 VRAIS Conference Report [4]. (Continued in Figure 44.)

- ▶ The attendance is about 1500 from 40 countries.
- ▶ Conference Committee
 - Fumio Harashima, Advisory Board Chair
 - Shun-Ichi Amari, Organizing Committee Chair
 - Toshio Fukuda, Steering committee Chair
 - Kunihiko Fukushima, Robert J. Marks II, Harold H. Szu and N. Sugie, Program Committee Chairs
- November 6: The NNC ExCom meets in Raleigh NC.

1994

- The pages in the IEEE TFS are increased to 400.
- The NNC Sponsors video series of presentations of NNC Neural Network Pioneer awardees. (See Figure 50.)

head-mounted displays, force reflecting feedback, animation, vision phenomena, acoustic displays, and applications.

The opening ceremony was held the evening of the second day of tutorials. It featured Tom Furness of the Human Interface Technology Laboratories at the University of Washington, a pioneer in this field and the general chair, speaking on the past and future of virtual reality. Also on the stage that night was the Organization Chair Bob Marks of the University of Washington, the Program Co-chairs, Michitaka Hirose of the University of Tokyo, General Chair Thomas Caudell of the University of New Mexico, and the General Chair of the next VRAIS conference, David Mizell of Boeing Computer Services. This conference will be held in North Carolina in March of 1995.

The technical sessions were held during the next three days of the conference. A 400 page proceedings, distributed at registration, contained seventy-two high quality technical papers from all over the world. These papers were selected through a review process involving the fifty members of the Program Committee. In addition, the conference sold out of the Video Proceedings, a collection of video shorts showing the state of research in virtual reality at several research institutions around the world.

Each day started out with a plenary session, where experts in the field reported on the state-of-the-art in virtual reality technology. The plenary speakers included Scott Fisher of Telepresence Research, Myron Kruger of Artificial Reality Corp., Roy Latham of CGSD Corp, Warren Robinett of the University of North Carolina, Creve Maples of Sandia National Laboratories, Michitaka Hirose of the University of Tokyo, Larry Stark of the University of California, Berkeley, and Jannick Rolland of the University of North Carolina.

Following each plenary session in the morning, the technical sessions broke up into two parallel tracks. Sessions covered topics such as body sensing, sensory transducers, sensory feedback, human factors, graphics, teleoperation, software systems, and even neural networks. Speakers were given generous half-hour time slots for their talks, which usually

Cover Photo: Michitaka Hirose, VRAIS 1993 Program Co-Chair; David Mizell, 1994 General Chair; Robert J. Marks II, 1993 Organization Chair, Thomas P. Caudell (wearing VR glasses), 1993 Program Co-Chair, and Thomas A Furness III 1993 General Chair

IEEE NEURAL NETWORKS COUNCIL NNC-SPONSORED CONFERENCES

NNC Forum: Virtual Reality and Persons with Disabilities
San Francisco
June 8-10, 1994

World Congress on Computational Intelligence
IEEE International Conference on Neural Networks
FUZZ-IEEE

IEEE International Symposium on Evolutionary Computation
June 26-July 2, 1994
Walt Disney World
Orlando Florida

1995 and Beyond...

Virtual Reality Annual International Symposium
March 11-16 95 (Note Date Change)
Research Triangle Park, North Carolina

FUZZ-IEEE (with IFES)
Yokohama Japan, March 1995

Int'l Conf on Neural Networks
IEEE Conf. on Evolutionary Programming
Perth, Australia, October 1995

ICNN, Washington DC, March 1995
FUZZ-IEEE New Orleans, September 1996

allowed time for questions and discussion. Speakers made frequent use of video tapes to illustrate their work.

The next two evenings were set aside for panels. David Mizell of Boeing Computer Society organized the Industry Panel, with representatives from Lockheed, Caterpillar, Ford, General Electric, and of course Boeing. The following night Y. T. Chien of the National Science Foundation organized the Government Panel, with representatives of Advanced Research Projects Agency, Dept. of Transportation/US Coast Guard, NASA Ames Research Center, and DoE Sandia National Laboratories. These panels helped focus the attendees on the realities of applications of this technology, and provided a glimpse of where government funding might be going over the next few years.

A small vendors exhibit was available to attendees during the five days of the conference, organized by Exhibits Chair Chris Esposito of Boeing Computer Services. People had an opportunity to talk first hand with the makers of virtual reality equipment and software, and see some demonstrations of their latest systems.

The conference was managed by Steve Marlin and Nomi Feldman of Meeting Management in Irvine California, and by Finance Chair Dmitry Kaplan of Siemens-Quantum Corp of Issaquah, Washington. Their creativity and resourcefulness made this a very smooth running conference, considering nearly twice as many people attended as was planned.

I would like to thank the 1993 IEEE-VRAIS Organizing and Program Committees, and all of the people who worked hard to make the venture a success. It is the goal of the Virtual Reality Technical Committee to make this conference THE conference in the field. I believe we have made a good start!

—Thomas P. Caudell, Chair
NNC Virtual Reality Technical Com.
VRAIS '93 Program Cochair
Dept. of Electrical & Computer Eng.
University of New Mexico
Albuquerque, NM 87131

Figure 44: 1993 VRAIS Conference Report [4]. (Continued from Figure 43.)

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presented by Elizabeth M. Wenzel, NASA-Ames Research Center and Scott H. Foster, Crystal River Engineering, Inc.

This video tutorial reviews the basic psychoacoustical cues that determine human sound locations and the techniques used to measure these cues. Experiments examining the perceptual validity of the syntheses technique and factors which can enhance perceptual accuracy and realism are discussed as well as recent attempts to implement these techniques in real-time systems.

FORCE REFLECTING INTERFACES TO TELEOPERATORS AND VIRTUAL ENVIRONMENTS

presented by Ed Colgate, Northwestern University and Blake Hannaford, University of Washington

Reviews the basic technologies available and the current state of research aimed at providing a sense of feel or physical content with virtual environments.

VIRTUAL REALITY ARCHITECTURE FOR DISTRIBUTED MULTI-USER ENVIRONMENTS

presented by Reza Jalili, IBM T.J. Watson Research Center

Presents an in-depth look at building Virtual Reality software. The system developed at IBM Research is used to illustrate these concepts.

APPLYING VIRTUAL ENVIRONMENT TECHNOLOGY TO TRAINING AND SIMULATION

presented by Hans Jense, TNO Physics and Electronics Laboratory

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Figure 45: IEEE EAB Videos on Virtual Reality sponsored by the NNC.

神経回路網国際会議

PAPERS may be submitted for consideration as oral or poster presentations in the following areas:

- Neurobiological Systems
- Cognitive Science
- Image Processing & Vision
- Speech, Hearing & Language
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- Neural Network Architectures
- Network Dynamics
- Optimization
- Self-organization
- Learning & Memory
- Robotics & Control
- Hybrid Systems
- (Fuzzy, Genetic, Expert System, AI)
- Implementation
- (Electronic, Optical, Bio-chips)
- Other Applications
- (Medical and Social Systems, Art, Economy, etc. : Please specify the area of the application)

Four page papers must be received by April 30, 1993. Please submit six(6) copies (one camera-ready original and five copies) of the papers on 210mm x 297mm (A4) or 8-1/2" x 11" (letter size) white paper with one inch margins on all four sides. Centered at the top of the first page should be the complete title, author(s), affiliation(s), and mailing address(es), followed by a blank space and then abstract, not to exceed 15 lines, followed by the text. The paper submitted over four pages will be charged 30,000 YEN per extra page. In an accompanying letter, the following should be included: full title of the paper, names, mailing addresses, tel. & fax no. and e-mail addresses of corresponding author and presenter, technical session names (1st. and 2nd. choices), presentation preferred (oral or poster) and audio visual requirements. Send Papers to: IJCNN'93-NAGOYA Secretariat. Papers will be reviewed by senior researchers in the field and all authors will be informed of the decisions at the end of the review process by June 30, 1993.

TUTORIAL will be held on Monday, October 25, 1993. The proposal should be one to two pages and describe in some detail the subject matter to be covered in the three-hour tutorial. Please mail proposals by January 5, 1993, to IJCNN'93-NAGOYA Secretariat.

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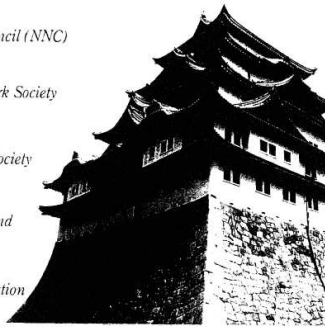
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Figure 46: 1993 Nagoya IJCNN CFP

Conference Reports

IJCNN-93 Nagoya

The international joint conference on Neural Networks (IJCNN'93-NAGOYA) was held in Nagoya, Japan from October 25 to 29, 1993 under the joint sponsorship of: The IEEE Neural Network Society (JNNS), Japan Neural Network Society (JNNS), International Neural Network Society (INNS), European Neural Network Society (ENNS), The Society of Instrument and Control Engineers (SICE), and The Institute of Electronics, Information and Communication Engineers (IEICE). It was the world's largest conference on neural networks, and this was the first time it was held in Japan. Nagoya is located between Tokyo and Osaka.

There were about 1500 participants from approximately 40 nations including participants to the public industrial forum. The Advisory Chair of the IJCNN'93-NAGOYA was Prof. F. Harashima, the Organizing Chair Prof. S. Amari, the Program Chair Prof. K. Fukushima, and the Steering Chair Prof. T. Fukuda.

The conference began with an opening lecture entitled "What Can We Expect from Neural Network Models?" by Prof. M. Ito, and two keynote lectures entitled "Strategies for Developing Effective Neural Network Applications" by Prof. D. E. Rumelhart and "The Brain and Computer" by Prof. S. Amari. An industry forum "How Does Neural-Technology Change Industries?" was also held which was open to the public. There were five panelists from financial, economic, industrial, and academic backgrounds. The titles of their talks are "Advanced Technology: Impact on Financial Industry and Financial Markets" by Dr. G. J. Deboeck, "Integrating Neural Network for Successful Industrial Application" by Prof. F. Fogelman-Soulie, "Neurocomputational Robots - The Primary Industry of the Next Millennium" by Dr. R. Hecht-Nielsen, "Applications of Neural Networks to Home Appliances" by Dr. T. Nitta, and "How the ANN can contribute to the industrial development" by Mr. K. Noguchi. Following the introduction by Prof. T. Fukuda, they had an active discussion on the past, present and future state of neural networks. They provided an opportunity for attendees to understand the possibility of applying neural networks in industrial, finance and other fields, and find new research & development issues and applications.

The remainder of the conference consisted of three keynote lectures entitled "Neural Networks in the Brain Involved in Memory and Recall" by Prof. E. T. Rolls, "Human Level Cognition in Embodied Robots" by Prof. R. A. Brooks, and "Improved Generalization Ability Using Constrained Neural Network Architecture" by Prof. K. Fukushima; 29 technical sessions where about 180 papers were presented; and 530 poster presentations. The technical programs were prepared by the Program Co-Chairs, Prof. K. Fukushima, Prof. R. J. Marks II, Dr. H. H. Szu, and Prof. N. Sugie. A pre-conference session of tutorials in seven fields: Neurophysiology, Biological Models, Nonlinear Systems, Learning, Control, Hardware, and Pattern Recognition and Connectionist Models, drew many participants. They included discussions of approaches based on a combination of neural networks and fuzzy logic as well as presentations on basic concepts of neural networks, fuzzy logic, and genetic algorithm.

The reception, banquet, and closing party were prepared by the Social Events Chair, Prof. K. Kosuge. The banquet speaker, Dr. Goto, the President of Makita Corporation, gave a very interesting speech entitled "Japanese Creativity & Flexibility."

Special sessions during the conference included a round table discussion on "Financial and Economic Applications of Advanced Technology," Real World Computing, President Forum, and Panel Discussion on "Standards for an International Language and Symbolology for Artificial Neural Networks, Performance Measure Methodology and Interfaces."

In the Presidents Forum, the presidents of neural network-related societies around the world introduced their activities and confirmed that there would be future exchange of information and various forms of cooperation.

Research on neural networks spans many fields. Topics of discussion were basic research such as brain physiology, neurobiology, cognitive science, learning methods, and neural network architecture, as well as application research such as recognition, optimization, control, hybrid systems, hardware, and its implementation. In particular, for the application to dynamic systems including "chaos," it was indicated that recurrent neural networks would be increasingly important. There was also

much interest in hybrid systems, or the fusion and integration of neural networks with fuzzy logic and evolutionary computation, i.e. genetic algorithms.

Neural networks research had become a popular subject with the notion that anything was possible. However, the fact seems to be subsiding somewhat as the boundaries of neural networks become clear from the results of much work in this area. This conference has been set up so that there were many papers presented on application. We can foresee that the fields where neural networks will actually be used will increase and broaden in the future, and it is envisioned that they will certainly be effective.

— Dr. Takanori Shibata
Member of the Steering Committee
IJCNN'93-NAGOYA
Bio-Robotics Div., Robotics Dept
Mechanical Engineering Laboratory,
MITI 1-2 Namiki, Tsukuba 305, Japan

Figure 47: 1993 Nagoya IJCNN conference report [40].



Figure 48: The 1993 Nagoya IJCNN. Robert J. Marks II (left), Toshio Fukuda, Conference Chair, and Takanori Shibata.

- January 22: The NNC AdCom meets in Dallas. The NNC constitution, recently changed, requires election to newly created offices.
 - ▶ James C. Bezdek is elected to new office of VP Conferences,
 - ▶ Stamatios V. Kartalopoulos is elected to new Office of VP Publications,
 - ▶ Clifford Lau is elected Executive Vice President, and
 - ▶ Piero P. Bonisoone, to VP Finance
- The new books sponsored by NNC (Stamatios V. Kartalopoulos, VP Publications) are
 - ▶ Simon Haykin, **Neural Networks: A Comprehensive Foundation**¹⁶
 - ▶ Madan M. Gupta and George K. Knopf, **Neuro-Vision Systems: Principles and Applications**
 - ▶ Madan M. Gupta and Dandina H. Rao, **Neuro-Control Systems: Theory and Applications**
 - ▶ David B. Fogel, **Evolutionary Computation: Toward a New Philosophy of Machine Intelligence.**¹⁷ (See Figures 51 and 53.)

¹⁶Now in its third edition.

¹⁷The book is now in its third edition [13].



Figure 49: Karaoke at the Nagoya IJCNN. LEFT: Robert Hecht-Nielsen sings *Surfin' USA*. MIDDLE: Sun-ichi Amari sings a Japanese ballad. David Rumelhart follows the words on the screen. Hecht-Nielsen, Amari and Rumelhart are all recipients of the IEEE NNC (now CIS) *Neural Networks Pioneer Award*.

- ▶ Jacek Zurada, Robert J. Marks II and C.J. Robinson; Editors, **Computational Intelligence: Imitating Life**, IEEE Press, 1994.¹⁸ (See Figure 54.)
- The first WCCI is held at Walt Disney World. (See Figures 55 and 59).
 - ▶ Charles Robinson is the Director General and Robert J. Marks II is the Technical Director
 - ▶ Congress Symposium: **Computational Intelligence: Imitating Life**
 - Jacek Zurada, Symposium Chair
 - Chapters from each of the invited speakers in this session were compiled in an IEEE Press book of the same name [45] and distributed to all conference attendee.
 - The book's editors write "To our knowledge, the publication of this book marks the first time the components of Computational Intelligence have been fused into a single volume." [42]. (See Figure 60.)¹⁹
 - ▶ ICNN (June 28 - July 2), (See Figure 56).

¹⁸This book is a compilation of papers from the plenary speakers at WCCI 94. Also see Figure 60.

¹⁹Also see Figure 54.

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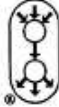
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Figure 50: NNC Pioneer Series sponsored by the NNC. Mohamed El-Sharkawi was the Video Chairman of the the NNC who coordinated the project.



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Figure 51: Zurada *et al.* and Fogel write two new books for IEEE Press sponsored by the NNC.

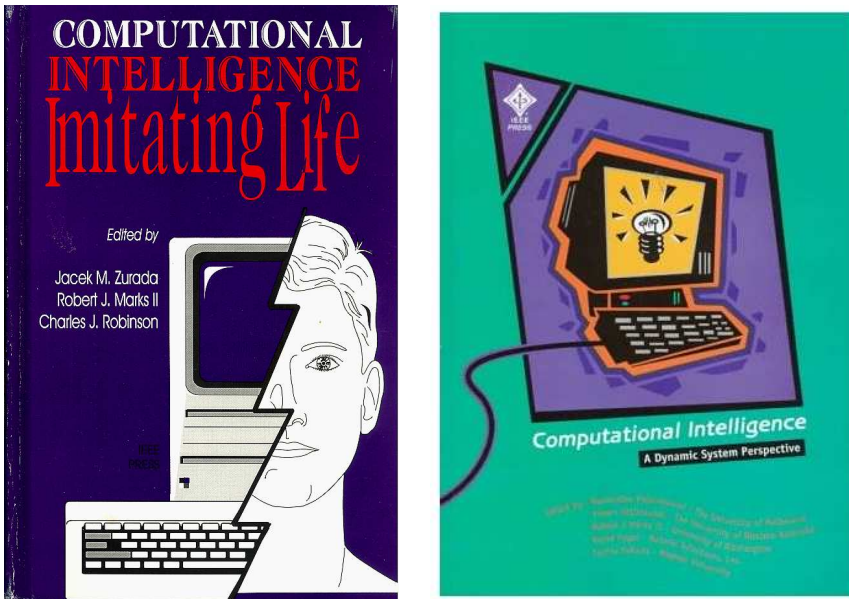


Figure 52: Volumes of plenary presentations from LEFT: the 1994 WCCI and, RIGHT: the Perth ICNN/ICEC.

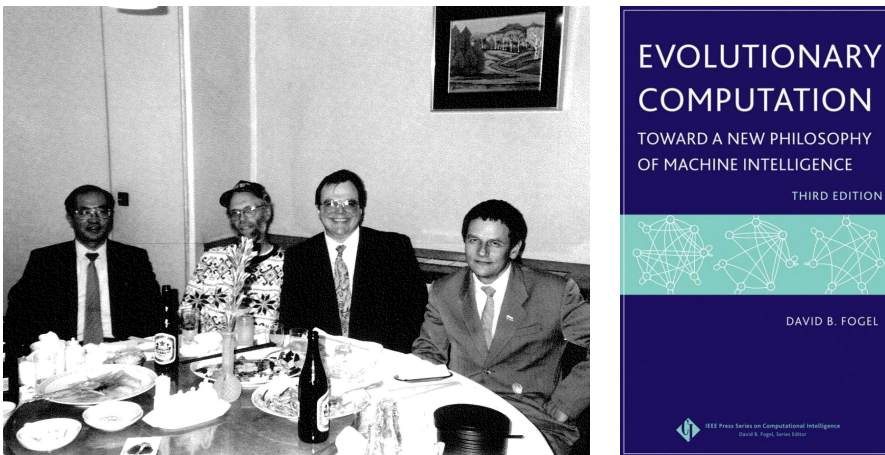
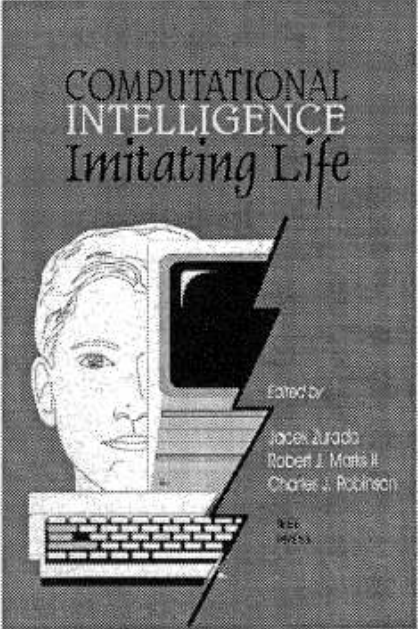


Figure 53: LEFT: At the Nagoya IJCNN. Fumio Harishima (University of Tokyo Dean), James C. Bezdek, Robert J. Marks II, Witali Dunin-Barkowski (President of the Russian Neural Networks Society. RIGHT: NNC sponsored: David B. Fogel, **Evolutionary Computation: Toward a New Philosophy of Machine Intelligence** [13].

COMPUTATIONAL INTELLIGENCE: Imitating Life

**edited by Jacek M. Zurada, University of Louisville,
Robert J. Marks II, University of Washington,
Charles J. Robinson, University of Pittsburgh**

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Figure 54: NNC sponsored plenary collection from 1994 WCCI.

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Deadline for paper submission: December 10, 1993

IN 1994
THE INTELLIGENT WORLD IS
COMING TO ORLANDO...



IEEE WORLD CONGRESS
ON
COMPUTATIONAL
INTELLIGENCE

FUZZ-IEEE
IEEE International Conference on Neural Networks
IEEE International Symposium on Evolutionary Computation

WORLD CONGRESS '94 • WORLD CUP

JUNE 26 - JULY 2, 1994
WALT DISNEY WORLD DOLPHIN HOTEL
Orlando, Florida

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5665 Oberlin Drive, #110
San Diego, California 92121
619-453-6222

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Figure 55: “In 1994, the intelligent world is coming to Orlando...” 1994 WCCI CFP.

- Steven K. Rogers (Air Force Institute of Technology, Wright-Patterson AFB, Ohio) General Chair,
 - Dennis W. Ruck (Air Force Institute of Technology, Wright-Patterson AFB, Ohio) and David Bounds (Aston University), Technical Program Chairs
- ▶ FUZZ-IEEE (See Figure 57).
- Piero P. Bonissone, General Chair
 - Enrique H. Ruspini and Hamid R. Berenji (NASA), Program Chairs
- ▶ ICEC (June 29-July 1), (See Figure 58). This is the first ICEC.
- Zbigniew Michalewicz (University of North Carolina) General Chair
 - J. David Schaffer (Vanderbilt University), H.P. Schwefel (Universität Dortmund, Germany) and Hiroaki Kitano (Sony Computer Science Laboratories), Program Chairs
- ▶ Over 200 attendees become new IEEE members at WCCI '94.
- July 2, 1994: The NNC AdCom meets at Walt Disney World.
- ▶ New officers elected for 1995. Three positions are open:
1. Walter Karplus, President,
 2. Piero P. Bonissonne, VP Finances, and
 3. Stamatios V. Kartalopoulos, VP Publications
- October 1: NNC ExCom meets in San Antonio.

1995

- Lotfi A. Zadeh (University of California - Berkeley), whose 1965 paper [44] founded fuzzy logic, is awarded the *IEEE Medal of Honor*,²⁰ IEEE's highest award [33]. Zadeh's citation reads:
- "For pioneering development of fuzzy logic and its many diverse applications."
- New books sponsored by the NNC are announced by Stamatios V. Kartalopoulos, VP Publications
- ▶ New
- Stamatios V. Kartalopoulos, **Understanding Neural Networks and Fuzzy Logic** (See Figure 61.)

²⁰ The Medal of Honor was first presented in 1917. "It is presented only when a candidate is identified as having made a particular contribution which forms a clearly exceptional addition to the science and technology of concern to the Institute."



The poster features a large teal arrow pointing towards the top right, and a magnifying glass with a teal handle and frame. Inside the magnifying glass is a stylized neural network logo consisting of two circles connected by a vertical line, with arrows pointing inwards from the top and outwards from the bottom.

IEEE INTERNATIONAL CONFERENCE ON NEURAL NETWORKS

Walt Disney World
Orlando, Florida
June 28 - July 2
1994

General Chair
Steven K. Rogers


Program Co-Chairs:
Dennis W. Ruck
Mitsuo Wada
David Bounds

CALL FOR PAPERS


**Deadline for paper submission:
December 10, 1993**

Topics:

- Applications
(specify area: medical, military, economic...)
- Architectures
- Artificially Intelligent Neural Networks
- Artificial Life
- Associative Memory
- Computational Intelligence
- Cognitive Science
- Embedology
- Filtering
- Fuzzy Neural Systems
- Hybrid Systems
- Image Processing
- Implementations (electronic, optical, biochips)
- Intelligent Control
- Learning and Memory
- Machine Vision
- Motion Analysis
- Neurobiology
- Neurocognition
- Neurodynamics
- Optimization
- Pattern Recognition
- Prediction
- Robotics
- Sensation and Perception
- Sensorimotor Systems
- Speech, Hearing and Language
- System Identification
- Supervised / Unsupervised Learning
- Tactile Sensors
- Time Series Analysis

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IEEE

Figure 56: 1994 ICNN CFP at WCCI. Disney is noted for the protection of its intellectual property. Nevertheless, note the resemblance of the neural network logo to a famous mouse.

FUZZ-IEEE '94

Third IEEE International Conference on Fuzzy Systems

June 26 - 29, 1994 Orlando, Florida

as part of the



IEEE World Congress on Computational Intelligence (June 26 - July 2, 1994)

CALL FOR PAPERS

Deadline for paper submission: December 10, 1993



The Third IEEE International Conference on Fuzzy Systems (FUZZ-IEEE '94) will be dedicated to the discussion of advances in:

- Basic Principles and Foundations of Fuzzy Logic
- Relations between Fuzzy Logic and other Approximate Reasoning Methods
- Qualitative and Approximate-Reasoning Modeling
- Hardware Implementations of Fuzzy-Logic Algorithms
- Design, Analysis, and Synthesis of Fuzzy-Logic Controllers
- Learning and Acquisition of Approximate Models
- Relations between Fuzzy Logic and Neural Networks
- Integration of Fuzzy Logic and Neural Networks
- Integration of Fuzzy Logic And Evolutionary Computing
- Applications to:
 - System Control
 - Intelligent Information Systems
 - Case-Based Reasoning
 - Decision Analysis
 - Modeling
 - Databases and Information Retrieval
 - Signal Processing
 - Image Understanding
 - Pattern Recognition
 - Robotics and Automation
 - Intelligent Vehicle and Highway Systems
 - Virtual Reality

This Conference will be a part of the 1994 IEEE World Congress on Computational Intelligence (WCCI-94). Two other conferences concerned with Neural Networks and Evolutionary Computing will complete the WCCI-94 program.

Conference Organizing Committee

<p>General Chair: Piero P. Bonissone Artificial Intelligence Laboratory General Electric CR & D</p>	<p>Conference Chairs: Enrique H. Ruspini Artificial Intelligence Center SRI International</p>	<p>Hamid R. Berenji Artificial Intelligence Research Branch NASA Ames Research Center</p>
--	--	---

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Figure 57: 1994 FUZZ-IEEE CFP at WCCI.

**THE IEEE CONFERENCE ON
EVOLUTIONARY COMPUTATION**

June 29 - July 1, 1994 Orlando, Florida
as part of the
IEEE World Congress on Computational Intelligence
(June 26 - July 2, 1994)

CALL FOR PAPERS
Deadline for paper submission: **December 10, 1993**

General Chair:
Zbigniew Michalewicz

Program Chairs:
J. David Schaffer • H. P. Schwefel • Hiroaki Kitano
America Europe Asia / Australia

Topics of the Conference include:

- Theory of evolutionary computation
- Applications of evolutionary computation
- Efficiency/robustness comparisons with other direct search algorithms
- Parallel computer applications
- New ideas incorporating further evolutionary principles (multi-cellularity, various data structures, subpopulations, etc.)
- Artificial life
- Evolutionary algorithms for computational intelligence (optimal neural networks, optimal fuzzy controllers, etc.)
- Comparisons between different variants of evolutionary algorithms
- Machine learning applications
- Evolutionary computation for neural networks
- Fuzzy logic in evolutionary algorithms

For Information Contact:
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San Diego, California 92121
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Figure 58: 1994 ICEC CFP at WCCI. This is the first ICEC.

- John Yen, Reza Langari, and Lotfi A. Zadeh, **Industrial Applications of Fuzzy Logic and Intelligent Systems** .
 - Madan M. Gupta and Naresh K. Sinha, **Intelligent Control Systems: Theory and Applications**. (See Figure 62.)
 - Marimuthu Palaniswami, Yianni Attikiouzel, Robert J. Marks II, David Fogel & Toshio Fukuda; Editors, **Computational Intelligence: A Dynamic System Perspective**, IEEE Press, 1995.
- NNC Book sales to date:
- Haykin 1594
 - Bezdek: 3005 Copies
 - Gupta/Ray 684

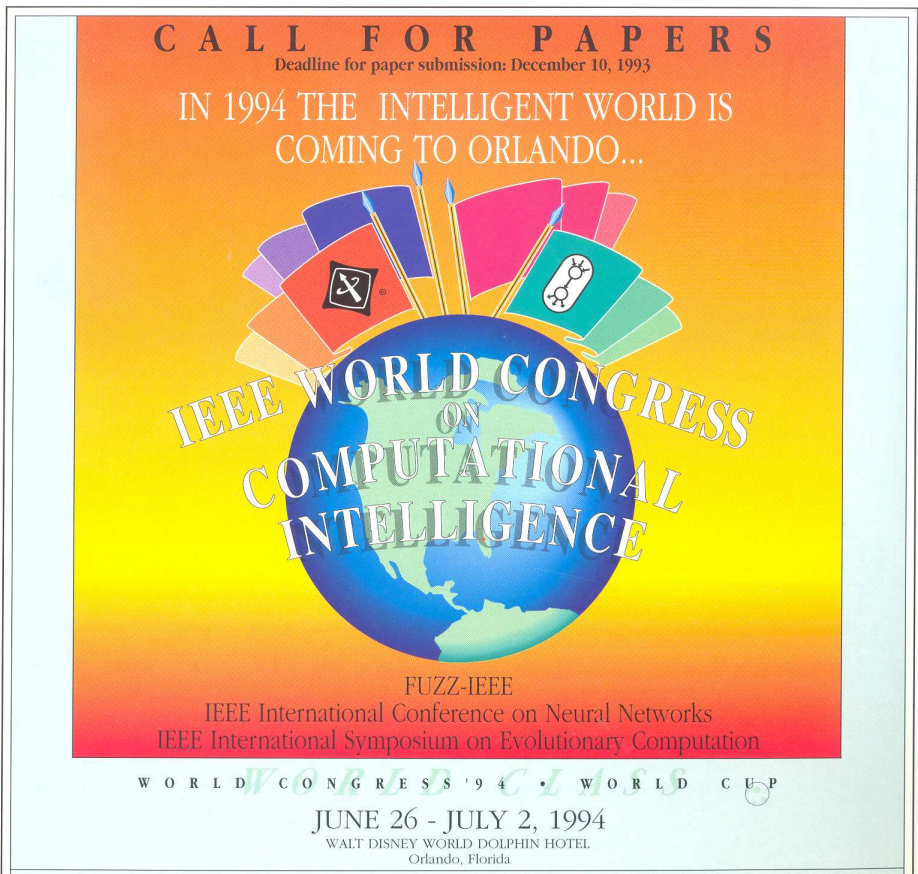


Figure 59: 1994 WCCI CFP.

- Sanchez/Lau 2309
- Lau 2890
- Zurada/Marks/Robinson 197

■ IEEE TRANSACTIONS ON NEURAL NETWORKS

- ▶ The TNN pages are increased to 1608.
- ▶ Cumulative submissions as of January 1 is about 2500 manuscripts [28].
- ▶ The Science Citation Index “impact factor” ranking for 1994 for the IEEE TNN are very favorable.²¹ [29]. Here are the rankings in several categories.

²¹The IEEE TRANSACTIONS ON FUZZY SYSTEMS was too young to be included in this list.

Books: Computational Intelligence: Imitating Life

Edited by Jacek Zurada, University of Louisville, Robert J. Marks II, University of Washington, and Charles J. Robinson, University of Pittsburgh. From IEEE Press and the IEEE World Congress on Computational Intelligence

In the Preface to *Computational Intelligence: Imitating Life*, the editors write, "To our knowledge, the publication of this book marks the first time the components of Computational Intelligence have been fused in a single volume."

This book has its origins at the 1994 IEEE World Congress on Computational Intelligence (WCCI) to be held this summer at the Walt Disney Dolphin Hotel in Orlando. The WCCI, for the first time, will bring together in time and space, major conferences on neural networks, fuzzy systems and evolutionary programming.

A special plenary symposium, addressing emerging issues in computational intelligence, was conceived as glue to provide continuity among the three conferences. The contributions to the symposium were thought to be so outstanding that an archival volume of the contributions

was felt appropriate."

After an introduction by the editors and an essay "What is Computational Intelligence?" by James Bezdek, the papers are presented in seven sections: Computational Learning Theory, Approximate Reasoning, Evolutionary Computation, Biological and Computational Pattern Recognition, Intelligent Control, Hybrid Computational Intelligence, and Applications.

Among the contributors are A.K. Jain, Robert Hecht-Nielsen, Rolf Eckmiller, Allen Waxman, Shiro Usui, and Toshio Fukuda

The book will be given to all full participants at WCCI and will be available after the Conference from the IEEE Press.

[List price \$49.95 (for IEEE members, \$40.00). To order, call IEEE Customer Service: (800)678-IEEE or (908)981-1393 or Fax (908)981-9667. IEEE Order No: PC04580.]

Figure 60: Announcement of **Computational Intelligence: Imitating Life**. [42, 45].

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 - 2 IEEE J QUANTUM ELECTRONICS
 - 3 IEEE T PATTERN ANAL
 - 4 IEEE T INFORM THEORY
 - 5 IEEE T NEURAL NETWORKS
- *Computer Science: Theory & Methods*
 - 1 IEEE T NEURAL NETWORKS
 - 2 COMPUT SURV
 - 3 ACM T COMPUT SYST
 - 4 J LOGIC PROGRAM
 - 5 REAL-TIME SYST
- *Computer Science: Hardware & Architecture*

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BASIC CONCEPTS AND APPLICATIONS
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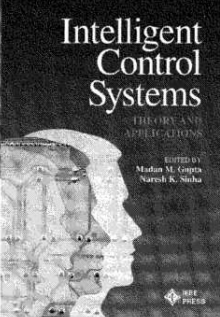
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Figure 61: Stamatios V. Kartalopoulos, *Understanding Neural Networks and Fuzzy Logic*.

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Foreword by Lotfi A. Zadeh

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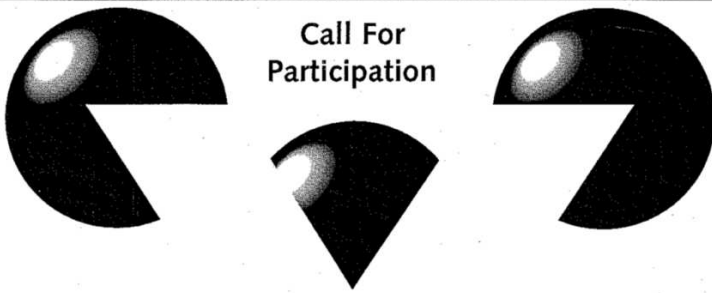


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Figure 62: Madan M. Gupta and Naresh K. Sinha, *Intelligent Control Systems: Theory and Applications*, IEEE Press.

-
- 1 IEEE T NEURAL NETWORKS
 - 2 COMMUN ACM
 - 3 J ASSOC COMPUT MACH
 - 4 IEEE T COMPUT
 - 5 PERFORM EVALUATION
 - *Computer Science: Artificial Intelligence*
 - 1 NEURAL COMPUTATION
 - 2 IEEE T PATTERN ANAL
 - 3 IEEE T NEURAL NETWORKS
 - 4 NEURAL NETWORKS
 - 5 ARTIF INTELL
 - IEEE TFS Pages increased from 400 to 520.
 - The NNC Newsletter will not be published in 1995. (After a few years absence, the newsletter is later reintroduced.)
 - March 12, 1995: The NNC AdCom meets at Research Triangle, NC.
 - March 11-15: (Second) VRAIS '95 is held at Research Triangle Park, North Carolina.
 - ▶ Cosponsored with IEEE Computer Society
 - ▶ Officers
 - General Chair, David Mizell, (Boeing Computer Services)
 - Organizing Chair, Robert J. Marks II
 - Program Chairs, Steve Bryson, (NASA Ames Research Center) and Steve Feiner, (Columbia University),
 - March 20-24, FUZZ-IEEE/IFES '95 is held in Yokohama. (See Figure 64.)
 - ▶ Conference Committee
 - Michio Sugeno, General Chair
 - Toshiro Terano, Organizing Committee Chair
 - Kaoru Hirota and Toshio Fukuda, Program Committee Chairs.
 - ▶ Sarin Gas Attack: On March 20, 1995, members of the Japanese cult *Aum Shinrikyo*, release sarin on several lines of the Tokyo Metro. A dozen people are killed, fifty are severely injured, and thousands suffer from temporary vision problems. This act of domestic terrorism remains the most serious attack to occur in Japan since the end of World War II.


Families of attendees of the Yokohama FUZZ-IEEE flooded the conference with calls of concern. Fortunately, none of the conference attendees were victims of the attack.



Call For Participation

VRAIS '95

March 11-15, 1995



TOPICS:

- Software Architectures
- Behavioral Modelling
- Tools and Techniques for Animation and Modeling in VR Systems
- Software Tools Development and Rapid Prototyping
- Artificial Intelligence Applied to VR
- Fuzzy Logic and Neural Networks Applied to VR
- Graphic Algorithms
- Distributed VR Systems
- Shared VR Systems
- Augmented Reality Systems
- VR Environment Design
- VR Interaction and Navigation Techniques
- Innovative and Useful Applications
- High Performance Driver Design


IEEE Virtual Reality
Annual International Symposium
Research Triangle Park, North Carolina
Sheraton Imperial Hotel & Convention Center

Sponsored by
The IEEE Neural Networks Council
and
The IEEE Computer Society Technical Committee on Computer Graphics


Cooperating: SPIE - The International Society for Optical Engineering
and SCS - The Society for Computer Simulation

TOPICS:



- Operating Systems Considerations
- Parallel Processing
- Telepresence and Telerobotics Actuators
- Human Factors of VR
- Calibration of VR Systems
- Registration with the Real World
- Evaluation of VR Techniques and Systems
- Safety Standards
- Graphics and Video Hardware
- VR Display Devices, including: Visual, Audio, Kinesthetic, Force, Tactile, Olfactory, and Taste Displays
- Sensors
- Position and Motion Tracking
- Gesture Recognition
- Wireless Computer Connections



The IEEE Computer Society



IEEE NEURAL NETWORKS COUNCIL

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Send 6 copies of full papers to the Meeting Management address. Papers should be submitted in either double column or single column/double space format. Papers are limited in length to no more than eight double-column/single space pages. Papers must be written in English. In a cover letter, please include the complete title of the paper and the corresponding address, phone, fax and email information.

<p>General Chair: David Mizel Boeing Computer Services</p> <p>PAPERS: Peer reviewed proceedings. Steven Bryson NASA Ames Research Center Bryson@nas.nasa.gov</p> <p>Steven Feiner Columbia University Feiner@cs.columbia.edu</p>	<p>PANELS</p> <p>WORKSHOPS: Small, informal, focused</p> <p>VIDEOS: Blake Hannaford University of Washington Blake@uw-isdl.ee.washington.edu</p>	<p>TUTORIALS: Beth Wenzel NASA Ames Research Center Beth@eos.arc.nasa.gov</p> <p>EXHIBITS: Karen Haines Dept. of EECE, UNM Karen@eece.unm.edu</p>	<p>DUE DATE FOR ALL SUBMISSIONS: August 15, 1994</p> <p>MAIL TO: Meeting Management 2603 Main Street, #690 Irvine, CA 92714 Tel. 714-752-8205 Fax 714-752-7444</p>
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Figure 63: VRAIS 1995 Call for Participation

FUZZ-IEEE/IFES'95

March 20-24, 1995

YOKOHAMA, Japan

The International Joint Conference of
the Fourth IEEE International Conference
on Fuzzy Systems

and
the Second International Fuzzy
Engineering Symposium

Call for Paper

Sponsored by IEEE-NNC, LIFE, SOFT, JIPDEC

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Toshiro Terano

General Chair:

Michio Sugeno

Program Committee Co-Chairs:

Kaoru Hirota

Toshio Fukuda

*** Topics of Interest ***

Basic concepts and methodology, fuzzy computing (hard
ware/software), genetic algorithms and evolutionary systems,
human interface, image understanding, intelligent systems,
neural networks, virtual reality, and applications to:
agriculture, behavioral science, business
management, civil engineering, control,
design and architecture, ecology, education,
industry, knowledge engineering, law,
medicine, natural language, operations
research, pattern recognition, psychology,
robotics, security, socio economics, etc.

*** Deadlines ***

Ten page paper (4 copies) to the secretariat: Aug. 31, 1994

Notification of acceptance: Oct. 31, 1994

Camera ready form submission to the secretariat: Dec. 15, 1994

*** Secretariat***

LIFE (Laboratory for International Fuzzy Engineering Research)
Siber Hegner Building 4FL, 89-1 Yamashita-cho, Naka-ku,
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attention : **Mieko Hemmi (Ms)**
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- S. Yasunobu (Japan)
- L. A. Zadeh (U.S.A)
- M. Zemankova (U.S.A)
- H.-J. Zimmermann (German)

Conference includes Exhibits, Plenary Sessions, Workshops, Competition and Social Activities





Figure 64: 1995 Yokohama FUZZ-IEEE CFP.

- April 9-12: The IEEE/IAFE Computational Intelligence for Financial Engineering CIFEr is held in NYC. (See Figures 65, 66, and 67.) If not involved with in finance, the first inclination of a practitioner of computational intelligence in finance is to forecast the market.²² Finance, though, has other ideas. Neural networks have found to be very useful, for example, in fraud detection. Chances are, when your credit card is scanned and checked, a neural network is helping.

CIFEr's venue is NYC to allow participation by financial practitioners.

- ▶ Robert C. Merton, (Harvard Business School), the CIFEr keynote speaker, was awarded the Nobel prize (with Myron Scholes) in Economics in 1997. Merton published the Merton model for pricing European options (1973), a more generalized pricing formula than the Black-Scholes model. Together, they constitute the Nobel Prize winning Black-Scholes-Merton model.
 - ▶ CIFEr is jointly sponsored with the International Association of Financial Engineers (IAFE)
 - ▶ There are 231 attendees at the first CIFEr.
 - ▶ Conference Committee
 - Scott Mathews, Organizing Chair
 - John F. Marshall (St. John's University) and Tomaso A. Poggio (MIT AI Lab), General Chairs
 - Andrew W. Lo (MIT Sloan School) and Robert J. Marks II, Program Chairs
 - A. N. Refenes (London Business School) and Toshio Fukuda, International Chairs
- November 27 - December 1: Both the ICNN and ICEC conferences are held in Perth, Australia. (See Figure 69.)
 - ▶ Conference Officers
 1. Yianni Attikiouzel (University of Western Australia), General Chair for both ICNN and ICEC
 2. David B. Fogel, Technical Chair for ICEC. Ah Chung Tsoi (University of Queensland), Assistant Technical Chair.
 3. Marimuthu Palaniswami (University of Melbourne), Toshio Fukuda, and Robert J. Marks II, Technical Program Chairs.
 4. Shun-Ichi Amari, International Liaison

²²The random walk model of market fluctuations says that this is not possible. John F. Marshall, CIFEr conference Co-Chair, is the world's first Professor of Financial Engineering. His advice is, if approached by a practitioner who claims to have a market forecasting system, you should cut to the quick and ask them what kind of car they drive. If, indeed, a good forecasting model is ever developed, it must be used in secret to avoid its diffusion of effectiveness by a free and open market.

Call for Papers

IEEE/IAFE Conference on Computational Intelligence for Financial Engineering (CIFER)

April 9-11, 1995, New York City, Crowne Plaza Manhattan

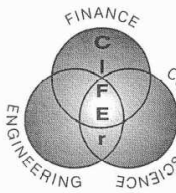
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The IEEE/IAFE CIFER Conference is the first major collaboration between the professional engineering and financial communities, and will be the leading forum for new technologies and applications in the intersection of computational intelligence and financial engineering. Intelligent computational systems have become indispensable in virtually all financial applications, from portfolio selection to proprietary trading to risk management. Topics in which papers, panel sessions, and tutorial proposals are invited include, but are not limited to, the following:

Financial Engineering Applications

- Asset Allocation
- Trading Systems
- Corporate Financing
- Forecasting
- Hedging Strategies
- Options and Futures
- Risk Arbitrage



Computer & Engineering Applications & Models

- Neural Networks
- Machine Intelligence
- Probabilistic Reasoning
- Fuzzy Systems
- Parallel Computing
- Pattern Analysis
- Genetic Algorithms
- Stochastic Processes
- Dynamic Optimization
- Knowledge & Data Engineering
- Time Series Analysis
- Harmonic Analysis
- Signal Processing
- Non-Linear Dynamics

Instructions for Authors, Panel Proposals, Special Sessions, Tutorials

All papers and proposals for tutorials, panels and special sessions must be received by the conference Secretariat at Meeting Management by November 1, 1994.

Exhibit Information

Businesses with activities related to financial engineering, including software & hardware vendors, publishers and academic institutions, are invited to participate in CIFER's exhibits. Further information about the exhibits can be obtained from the CIFER Secretariat, Barbara Klemm.

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Baker Professor of Business Administration
Harvard Business School

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Brain Sciences Department
John Marshall, Professor of Finance
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London Business School

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Toshio Fukuda, Dept. of Mechanical Eng.
Nagoya University, Japan

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Bothell, WA

Tutorials Chairs
Douglas Stone, Frank Russell R&D, Tacoma WA
Joe R. Brown, MCC, Austin, TX
David Schwartz, Mitsubishi Bank, NY

Finance Chair
Christine Alan, CPA, Motorola, AZ

Exhibits Chair
Steve Piche, MCC, Austin, TX

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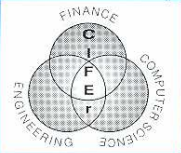
Publications Chair
Donald Wunsch, Dept. of Electrical Engineering,
Texas Tech University

For More Information Contact:
Meeting Management
2603 Main Street, Suite 690,
Irvine, CA 92714
(714) 752-8205 Fax (714) 752-7444
Email: 74710.2266@compuserve.com

Early registration is \$350 for IEEE (Institute of Electrical and Electronic Engineers, Neural Networks Council or Computer Society) and IAFE (International Association of Financial Engineers) members. Contact Barbara Klemm of Meeting Management for details. 2603 Main Street, Suite #690, Irvine, CA 92714. Tel. (714) 752-8205. Fax (714) 752-7444.

Figure 65: CIFER 1995

IEEE/IAFE
Annual Conference on






**COMPUTATIONAL
INTELLIGENCE
FOR
FINANCIAL
ENGINEERING**
(CIFEr '97)

**Crowne Plaza
Manhattan**
New York City
March 23-25, 1997

Sponsors :
The IEEE Neural Networks Council
The International Association of
Financial Engineers

Call for Papers

The IEEE/IAFE CIFEr '97 Conference is the third annual collaboration between the professional engineering and financial communities, and is one of the leading forums for new technologies and applications in the intersection of computational intelligence and financial engineering. Intelligent computational systems have become indispensable in virtually all financial applications, from portfolio selection to proprietary trading to risk management. Topics in which papers, special sessions, panel sessions and tutorial proposals are invited include, but are not limited to the following:

Conference Topics

Financial Engineering Applications :

- Risk Management
- Pricing of Structured Securities
- Trading Systems
- Forecasting
- Hedging Strategies
- Risk Arbitrage
- Behavioral Finance
- Exotic Options

Computer & Engineering Applications & Models :

- Neural Networks
- Probabilistic Modeling/Inference
- Fuzzy Systems and Rough Sets
- Genetic & Dynamic Optimization
- Intelligent Trading Agents
- Trading Room Simulation
- Time Series Analysis
- Non-Linear Dynamics

Figure 66: The IEEE/IAFE Computational Intelligence for Financial Engineering CIFEr call for papers. (Continued in Figure 67.)

5. James C. Bezdek, US Liaison
 6. Peter Noakes (University of Essex), European Liaison
- ▶ About 210 papers received for ICEC.
 - ▶ Motivated by the WCCI 1994 Plenary book [45], the Perth conference spawned an edited IEEE Press book titled **Computational Intelligence: A Dynamic System Perspective** [32].
- June 22, 1995: The NNC AdCom meets in Washington DC
- ▶ Newly elected officers for 1996
 - Walter Karplus, President (1 more year)
 - Piero Bonnisone, (2 year term)
 - Antii Koivo, VP Meetings (2 year term)
 - ▶ Motion: “The President of the NNC is directed to initiate the tasks necessary to effect the transition of the NNC to become the Computational Intelligence Society on as early a date as possible.”

Conference Committee
General Co-Chairs
John Marshall
 Professor of Financial Engineering,
 Polytechnic University
 New York, NY

Robert Marks
 Professor of Electrical
 Engineering, University of Washington
 Seattle, WA

Program Committee Co-Chair
Benjamin McInam, Ph.D.
 RUTCOR-Rutgers University's Center for
 Operations Research,
 New Brunswick, NJ

Organizational Chair
Payman Arabeshahi
 Professor of Electrical
 Engineering, University of Washington
 Seattle, WA

Conference Liaison
Scott Mathews
 Senior Associate
 Marshall, Tucker and Associates
 Edmonds, WA

Publicity Chair
Michael Wolf
 General Manager Financial Products
 The Mathworks, Inc.
 Natick, MA

CIFER Secretariat
Barbara Klemm
 Meeting Management
 CIFER '97 Conference Office
 2603 Main Street, Suite 690
 Irvine, California 92714
 Ph 800-321-6338, FAX 714-752-7444
 E-mail: Meetingmg@aol.com

**Latest updates and information are at the CIFER
 Homepage under "Neural Networks Conferences"
<http://www.ieee.org/nnc/cifer97>**

**INSTRUCTIONS FOR AUTHORS,
 PANEL PROPOSALS, SPECIAL SESSIONS,
 TUTORIALS**

All summaries and proposals for tutorials, panels and special sessions **must be received by the conference Secretariat at Meeting Management by November 15, 1996.**

**AUTHORS
 (FOR CONFERENCE PRESENTATION)**

Two copies of the Extended Summary (not exceeding four pages of 8.5 inch by 11 inch size) must be received by Meeting Management by November 15, 1996. Centered at the top of the first page should be the complete title, author name(s), affiliation(s) and mailing address(es). Fonts no smaller than 10 pt must be used. No figures or equations may be hand drawn. Papers must report original work that has not been published previously, and is not under consideration for publication elsewhere. In the letter accompanying the submission, the following information must be included:

- Topics
- Title of paper
- Corresponding Author's name
- Mailing address
- Telephone and fax
- E-mail (if available)
- Presenter (if different from corresponding author, please provide name, mailing address, etc.)

Authors will be notified of acceptance of their Extended Summary for oral or poster presentation by January 10, 1997.

Complete papers (up to a maximum of seven 8.5 x 11 inch pages) will be due by February 10, 1997, and will be published in the conference proceedings.

NOTE: BY SUBMITTING A PAPER FOR CIFER '97, YOU ARE AGREEING THAT IF IT IS ACCEPTED, YOU WILL ATTEND THE CONFERENCE TO PRESENT IT. (Accepted Authors are allowed the special discount registration fee of \$350.)

**INSTRUCTIONS FOR AUTHORS,
 PANEL PROPOSALS, SPECIAL SESSIONS,
 TUTORIALS**

A limited number of special sessions will address subjects within the topical scope of the conference. Each special session will consist of from four to six papers on a specific topic. Proposals for special sessions will be submitted by the session organizer and should include:

- Topic(s)
- Title of Special Session
- Name, address, phone, fax, and e-mail of session organizer
- List of paper titles with authors' names and addresses
- One page of summaries of all papers

Notification of acceptance of special session proposals will be on December 12, 1996. If a proposal for a special session is accepted, the authors will be invited to submit a final, ready copy of their paper for the conference proceedings by February 10, 1997.

PANEL PROPOSALS

Proposals for panels addressing topics within the technical scope of the conference will be considered. Panel organizers should describe, in two pages or less, the objective of the panel and the topic(s) to be addressed. Panel sessions should be interactive with panel members and the audience, and should not be a sequence of paper presentations by the panel members. The participants of the panel must be identified. No papers will be published from panel activities. Notification of acceptance of panel session proposals will be on January 10, 1997.

TUTORIAL PROPOSALS

Proposals for tutorials addressing subjects within the topical scope of the conference will be considered. Proposals for tutorials should describe, in two pages or less, the objective of the tutorial and the topic(s) to be addressed. A detailed syllabus of the course contents should also be included. Most tutorials will be four

**INSTRUCTIONS FOR AUTHORS,
 PANEL PROPOSALS, SPECIAL SESSIONS,
 TUTORIALS**

hours in length, although proposals for longer tutorials will also be considered. Notification of acceptance of tutorial proposals will be on January 10, 1997.

EXHIBIT INFORMATION

Businesses with activities related to financial engineering, including software and hardware vendors, publishers, and academic institutions, are invited to participate in CIFER's exhibit program. Further information about the exhibits can be obtained from the CIFER Secretariat, Barbara Klemm at Meeting Management.

SPONSORS

Sponsorship for the CIFER Conference is being provided by the IAFE (International Association of Financial Engineers) and the IEEE Neural Networks Council. The IEEE (Institute of Electrical and Electronics Engineers) is the world's largest engineering and computer science professional non-profit association and sponsors hundreds of technical conferences and publications annually. The IAFE is a professional non-profit financial association with members worldwide specializing in new financial product design, derivative structures, risk management strategies, arbitrage techniques, and application of computational techniques to finance.

Early conference registration (prior to March 7, 1997) is available for IEEE Neural Networks Council and IAFE (International Association of Financial Engineers) members, and \$100 for Students. Contact Barbara Klemm at Meeting Management for details: CIFER '97 Conference Office, 2603 Main Street, Suite 690, Irvine, CA 92714. Phone: 800-321-6338. FAX: 714-752-7444. E-Mail: Meetingmg@aol.com

Figure 67: The IEEE/IAFE Computational Intelligence for Financial Engineering CIFER call for papers. (Continued from Figure 66.)

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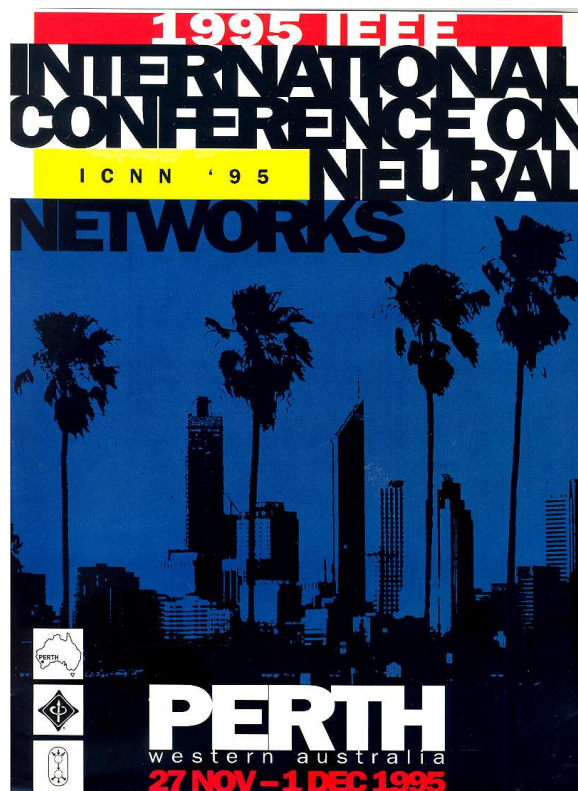


Figure 68: Perth ICNN CFP

- ▶ The NNC approves establishment of a home page on the World Wide Web. Payman Arabshahi, (University of Washington), is the NNC's first webmaster. (See Figure 70.)

1996

■ TNN

- ▶ The TNN Outstanding Paper award is given to G.V. Puskorius and L. A. Feldkamp [34].
- ▶ Combined subscriptions to TNN and TFS now exceed 15,000.

■ There are now five technical committees of the NNC

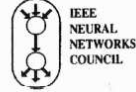
- ▶ Computational Finance
- ▶ Evolutionary Computation

1995 IEEE International Conference
on
Neural Networks
27 November - 1 December 1995

1995 IEEE International Conference
on
Evolutionary Computation
29 November - 1 December 1995



Perth, Western Australia
ICNN/ICEC General Chair: Yianni Attikiouzel
University of Western Australia



ICNN Technical Program Co-Chairs:
Marimuthu Palaniswami, University of Melbourne
Toshio Fukuda, Nagoya University
Robert J Marks II, University of Washington
International Liaison Chair Shun-ichi Amari University of Tokyo
US Liaison Jim Bezdek, University of West Florida
European Liaison Peter Noakes, University of Essex

Natural and artificial neural networks and associated topics:

Applications—Motion Analysis Architectures—Neurobiology—Artificially Intelligent Neural Networks—Neurocognition—Associative Memory—Neurodynamics—Computational Intelligence—Optimization—Cognitive Science—Pattern Recognition—Filtering—Prediction—Fuzzy Neural Systems—Robotics—Hybrid Systems—Sensation and Perception—Image Processing—Sensorimotor Systems Implementations—Speech, Hearing and Language—Intelligent Control—System Identification—Learning and Memory—Supervised/Unsupervised Learning—Machine Vision—Time Series Analysis

ICEC Technical Chair
David B. Fogel Natural Selection, Inc.
Assistant Technical Chair:
Ah Chung Tsoi, University of Queensland

Theory and applications of genetic and evolutionary algorithms, and associated topics:
Theory of evolutionary computation—Applications of evolutionary computation—Efficiency/robustness comparisons with other direct search algorithms—Parallel computer implementations—Artificial life—Evolutionary algorithms for computational intelligence—Comparisons between different variants of evolutionary algorithms—Machine learning applications—Evolutionary computation for neural networks—Fuzzy logic in evolutionary algorithms

ADDRESSES

ICNN'95 submissions and all other correspondence regarding the conferences, *except* submissions of papers to ICEC

ICNN/ICEC Conference Management
Centre for Intelligent Information
Processing Systems
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Nedlands WA 6009
AUSTRALIA
Tel: +61 9 380 1969
Fax: +61 9 380 1101
Electronic mail: ec95@ee.uwa.edu.au
icnn95@ee.uwa.edu.au
ICEC Submissions:
David B. Fogel
Natural Selection, Inc.
1591 Calle De Cinco
La Jolla, CA 92037 USA

SCHEDULE

Proposals for tutorials, exhibits and plenaries **31 March 1995**
Submission of papers **5 May 1995**
Notification of acceptance **7 July 1995**
Submission of camera-ready papers **25 August 1995**

SUBMISSION PROCEDURE

Prospective authors are invited to submit papers related to the listed topics for oral or poster presentation. Five (5) copies of the paper must be submitted for review. Papers should be printed on ISO A4 or USA 8.5" x 11" white paper, written in English in one-column format in Times or similar font style, 10 points or larger with 2.5cm (1") margins on all four sides. A length of four pages is encouraged, and a limit of six pages, including figures, tables and references will be enforced. Centered at the top of the first page should be the complete title and the name(s), affiliation(s) and address(es) of the author(s). The Paper Submission Cover Sheet (available via e-mail from conference management) should be completed and attached to the submission.

Treasurer: Svetha Venkatesh, Curtin University of Technology, Perth
Local Arrangements: Dorota Kieronska, Curtin University of Technology
Publicity Chair: Chris deSilva, University of Western Australia, Perth

Figure 69: ICNN/ICEC Perth, Australia CFP.



VISIT the IEEE Neural Networks Council's amazing Homepage on the Web!

<http://www.ieee.org/nnc>

Your one-stop resource for information on:



The IEEE NNC

Our mission, IEEE member societies, and contact information for NNC officers.



Publications of the IEEE NNC

Books, videos, and journals of the IEEE NNC, including the latest journal table of contents, abstracts of papers in review, and information for authors.



CONNECTIONS: The NNC Newsletter

The online newsletter of the IEEE NNC featuring articles on the latest technological trends in computational intelligence and news on meetings and conferences.



Neural Networks Research

Links to over 130 Neural Computing research programs and professional societies worldwide, latest books in the field, and IEEE NNC Regional Interest Groups.



Neural Networks Conferences

Up-to-date information on over 100 conferences and symposia in the field of computational intelligence.

We welcome your comments and suggestions. Visit us on the web and drop us a line!

Payman Arabshahi, Editor, IEEE NNC Homepage, Department of Electrical Engineering, Box 352500,
University of Washington, Seattle, WA 98195-2500, E-mail: payman@ee.washington.edu

Figure 70: The NNC first establishes its presence on the WWW.

Call for Papers

Second Annual IEEE/IAFE Conference on Computational Intelligence for Financial Engineering

March 1996, New York City

The IEEE/IAFE CIFE_r Conference is the major collaboration between the professional engineering and financial communities, and the leading forum for new technologies and applications in the intersection of computational intelligence and financial engineering. Intelligent computational systems have become indispensable in virtually all financial applications, from portfolio selection to proprietary trading to risk management. Topics in which papers, panel sessions, and tutorial proposals are invited include, but are not limited to, the following:

<p>Financial Engineering Applications</p> <ul style="list-style-type: none"> Risk Management Pricing of Structured Securities Trading Systems Forecasting Hedging Strategies Risk Arbitrage Asset Allocation Exotic Options 		<p>Computer & Engineering Applications & Models</p> <ul style="list-style-type: none"> Neural Networks Probabilistic Reasoning Fuzzy Systems and Rough Sets Genetic Algorithms Stochastic Processes Dynamic Optimization Time Series Analysis Non-Linear Dynamics
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Conference General Co-Chair
John Marshall
Professor of Financial Engineering
Polytechnic University of New York





Conference General Co-Chair
Robert Marks
Professor of Electrical Engineering
University of Washington

For more information contact:
Meeting Management 2603 Main Street, Suite 690, Irvine, CA 92714
(800) 321-8338 (714) 752-8205 Fax (714) 752-7444

Figure 71: CIFE_r 1996.

- ▶ Fuzzy Systems
 - ▶ Neural Networks
 - ▶ Virtual Reality
- An MSc degree in Computational Intelligence is offered in the Computer Science Department, University of London (Royal Holloway). This marks the first time the term *computational intelligence* is part of a degree title.
 - March 24-26, CIFE_r 1996 NYC. (See Figure 71.)
 - ▶ Jack Marshall and Robert J. Marks II, Conference Chairs
 - ▶ Robert Golan, Organization Chair

- March 30- April 3: VRAIS is held in Santa Clara. Steve Bryson is the General Chair
- May 20-22: The ICEC is held in Nagoya, Japan. (See Figure 72 for CFP.)
 - ▶ Conference Committee
 - Toshio Fukuda, General Chair
 - Zbigniew Michalewicz, Thomas Baek (University of Dortmund) and Hiroaki Kitano (Sony Computer Science Laboratory) are the Program Chairs
- June 2-6: IEEE ICNN is held in Washington D.C. (See Figure 73.)
 - ▶ Conference Committee
 - Benjamin Wah (University of Illinois) General Chair
 - Bing Sheu (USC), Program Chair
- The number of papers dealing with neural networks continues to increase. To give a feeling what the paper numbers in Figure 2 mean, we ask: what would happen if the neural networks publications were stacked by the US Capitol Building? For the answer, see Figure 74.
- Neural Networks in Politics.
 - ▶ President Clinton used neural networks in his reelection bid in 1996. Syndicated columnist, Robert Novak, writes in his February 18, 1996 column [30]:
 - “President Clinton’s pollsters have identified the voters who will determine whether he will be elected to a second term: two parent families whose members bowl for recreation.
 - “Using a technique they call the ‘Neural Network,’ Clinton advisors contend that these family bowlers are the quintessential voters. Therefore, these are quintessential voters. Therefore, these are the people who must be targeted by the President.
 - “A footnote: Two decades ago, Illinois Democratic Governor Dan Walker campaigned heavily in bowling alleys in the belief he could find swing voters there. Walker had national political ambitions but ended up in federal prison.”
 - ▶ The Democrats hold their 1996 presidential convention in Chicago. Twenty six years before, in 1968, the Chicago presidential convention was marred by violent clashes between demonstrators and police. A presidential commission called the conflict a “police riot”. In 1968, Richard J. Daley was mayor of Chicago. In 1996, his son, Richard M. Daley, is mayor. In order to belay a repeat incident at the 1996



CALL FOR PAPERS
1996 IEEE International Conference on
Evolutionary Computation (ICEC'96)
 May 20-22, 1996, Nagoya, Japan



Co-sponsored by
 IEEE Neural Network Council (NNC) and Society of Instrument and Control Engineers (SICE)

Technically Co-sponsored by
 Robotics Society of Japan(RSJ), Japan Society for Fuzzy Theory and Systems(SOFT)
 Japan Society of Mechanical Engineers(JSME)

Topics : Theory of evolutionary computation, Applications of evolutionary computation, Efficiency / robustness comparisons with other direct search algorithms, Parallel computer implementations, Artificial life and biologically inspired evolutionary computation, Evolutionary algorithms for computational intelligence, Comparisons between different variants of evolutionary algorithms, Machine learning applications, Genetic algorithm and self-organization, Evolutionary computation for neural networks, Fuzzy logic in evolutionary algorithms

Submission Procedure : Prospective authors are invited to submit papers related to the listed topics for oral or poster presentation. Five(5) copies of the paper must be submitted for review. Papers should be printed on letter size white paper, written in English in two-column format in Times or similar font style, 10 points or larger with 2.5 cm margins on all four sides. A length of four pages is encouraged, and a limit of six pages, including figures, tables and references will be enforced. Centered at the top of the first page should be the complete title of the paper and the name(s), affiliation(s) and address(es) of the author(s). All papers (except those submitted for special sessions - which may have different deadlines - see information on special sessions below) should be sent to:

Takeshi Furuhashi, Dept. of Information Electronics, Nagoya University
Furo-cho, Chikusa-ku, Nagoya 464-01, JAPAN

Phone: +81-52-789-2792 Fax: +81-52-789-3166 E-mail: furuhashi@nuee.nagoya-u.ac.jp

Important Dates:	
Proposal for tutorial/exhibits	:November 15, 1995
Submission of Papers (except for special sessions)	:December 20, 1995
Notification of acceptance	:February 20, 1996
Submission of camera-ready papers	:April 10, 1996

Special Sessions:

"Constrained Optimization, Constraint Satisfaction and EC" organized by Gusz Eiben, chair (Utrecht University)
 "Evolutionary Artificial Neural Networks" organized by X. Yao (The University of New South Wales)
 "Evolutionary Robotics and Automation" organized by J. Xiao (University of North Carolina)
 "Genetic Programming" organized by John R. Koza (Stanford University)
 "Self-adaptation in Evolutionary Algorithms" organized by Guenter Rudolph (ICD Informatik Centrum Dortmund e.V.)
 "Evolutionary Algorithms and Fuzzy Systems" organized by Witold Pedrycz (University of Manitoba)
 "Be Darwinian: Make Your Evolutionary-Based Optimization Algorithm Compete with All Others" organized by Hugues Bersini (Universite Libre de Bruxelles)
 "Non-Darwinian Evolutionary Algorithms" organized by Qiangfu Zhao (University of Aizu)

Submission to Special Sessions:

Four (4) copies of complete papers (6 pages maximum) should be submitted to each session organizer.

Important Dates for Special Sessions:	
Submission of Papers for special sessions	:December 15, 1995
Notification of acceptance	:February 15, 1996
Submission of camera-ready papers	:April 10, 1996

The deadline for proposals for organizing other special sessions during the 3rd IEEE ICEC '96 is August 20, 1995; submit your proposal to any Program Co-Chair.

Program Co-Chairs:

Zbigniew Michalewicz (University of North Carolina) zbyszek@uncc.edu	Thomas Baack (University of Dortmund) baack@lumpi.informatik.unidortmund.de	Hiroaki Kitano (Sony Computer Science Laboratory) kitano@csl.sony.co.jp
--	--	--

General Chair

Toshio Fukuda, Dept of Micro System Engineering, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-01 JAPAN
 Phone: +81-52-789-4478, Fax: +81-52-789-3909, E-mail: fukuda@mcin.nagoya-u.ac.jp

ICEC'96 will be organized in conjunction with the conference of Artificial Life (May 16-18, 1996, Kyoto, JAPAN)

Figure 72: 1996 Nagoya ICEC CFP.

Call For Papers

International Conference on Neural Networks (ICNN '96)

Sheraton Washington Hotel, Washington, D.C., USA

TUTORIALS: June 2, 1996, CONFERENCE: June 3-6, 1996



This conference is a major international forum for researchers, practitioners, managers, and policy makers interested in the design, development, and application of natural and artificial neural networks. Submissions of papers related, but not limited, to the topics listed below are invited.

Applications	Electronic and Optic	Machine Vision	Robotics
Architectures	Implementations	Motion Analysis	Sensation and Perception
Artificially Intelligent Neural	Filtering	Neurobiology	Sensorimotor Systems
Networks	Fuzzy Neural Systems	Neurocognition	Speech, Hearing, and Language
Associative Memory	Hybrid Systems	Neurodynamics and Chaos	System Identification
Cellular Neural Networks	Image and Signal Processing	Optimization	Supervised/Unsupervised
Computational Intelligence	Intelligent Control	Pattern Recognition	Learning
Cognitive Science	Learning and Memory	Prediction	Time Series Analysis

PAPERS MUST BE RECEIVED BY THE PROGRAM CHAIR BY OCTOBER 16, 1995. Papers received after that date will be returned unopened. International authors should submit their work via Air Mail or Express Courier so as to ensure timely delivery. All submissions will be acknowledged by electronic or postal mail.

Six copies (one original and five copies) of the paper must be submitted. Papers must be camera-ready on 8 1/2 by 11 white paper, one-column format in Times or similar font style, 10 points or larger with one inch margins on all four sides. Do not fold or staple the original camera-ready copy. Four pages are encouraged; however, the paper must not exceed six pages, including figures, tables, and references, and should be written in English. Submissions that do not adhere to the guidelines above will be returned unreviewed.

Papers will be reviewed by senior researchers in the field, and authors will be informed of the decisions at the end of the review process by **January 23, 1996**. A limited number of papers will be accepted for oral and poster presentations. Authors will be allowed to revise their papers, and the final versions must be submitted by **February 23, 1996**.

Centered at the top of the first page should be the complete title, author name(s), and postal and electronic mailing addresses. In the accompanying letter, the following information must be included:

- Full Title of the Paper
- Technical Session (First and Second Choices)
- Corresponding Author (Name, Postal and E-Mail Addresses, Telephone & FAX Numbers)
- Presenter (Name, Postal and E-Mail Addresses, Telephone & FAX Numbers)
- Presentation Preferred (Oral or Poster)
- Audio Visual Requirements (e.g. 35 mm Slide, OHP, VCR)

BEST STUDENT PAPER AWARDS. To qualify, a student or group of students must be the PRIMARY AUTHOR(S) and have contributed over 70% of the paper. The student must remain to be a student when the final revision is submitted in February 1996. The submission should clearly indicate that the paper is to be considered for the best student paper award, the amount of contribution by the student, university, current level of study, and e-mail address.

SPECIAL SESSIONS. Proposals may be submitted to the Special Session Chair by **October 1, 1995**.

PANEL SESSIONS. ICNN'96 is planning to organize a number of very exciting panels as an integral part of the technical program. The panel moderator will be soliciting statements from panelists summarizing their views for inclusion in the conference proceedings. Each panelist will be asked to give a brief presentation at the conference (5-10 minutes max) so that adequate time is left for interaction with the audience. Proposals for panels are solicited and should be submitted to the Panel Session Chair before **November 1, 1995**. Please include in your proposal the following items: (1) Panel title, (2) one or two paragraphs describing the panel aims and scope, and (3) list of proposed panelists and their affiliations.

EXHIBITOR INFORMATION. Exhibitors are encouraged to present the latest innovations in neural networks, including electronic and optical neural computers, fuzzy neural networks, neural network VLSI chips and development systems, neural network design and simulation tools, software systems, and application demonstration systems. A large group of vendors and participants from academia, industry and government are expected. Potential exhibitors should submit their requirements to the General Chair by **December 1, 1995**.

HOME PAGE. Conference information is maintained by the Publicity Chair, Joseph R. Cavallaro, on the World Wide Web at <http://www-ece.rice.edu/96icnn>

Program Chair

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EP/Powell Hall 604
Los Angeles, CA 90089-0271
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Special Session Chair

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phone: (502) 852-6314
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Panel Session Chair

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phone: (614) 292-0351
fax: (614) 292-7596

General Chair

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Coordinated Science Lab.
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phone: (217) 333-3516
fax: (217) 244-7175

Sponsored by the IEEE Neural Network Council

Conference Secretariat: Meeting Management, 2603 Main Street, #690, Irvine, CA 92714
Phone: (714) 752-8205 Fax: (714) 752-7444 Email 74710.2266@compuserve.com

Figure 73: 1996 Wahington D.C. ICNN CFP.

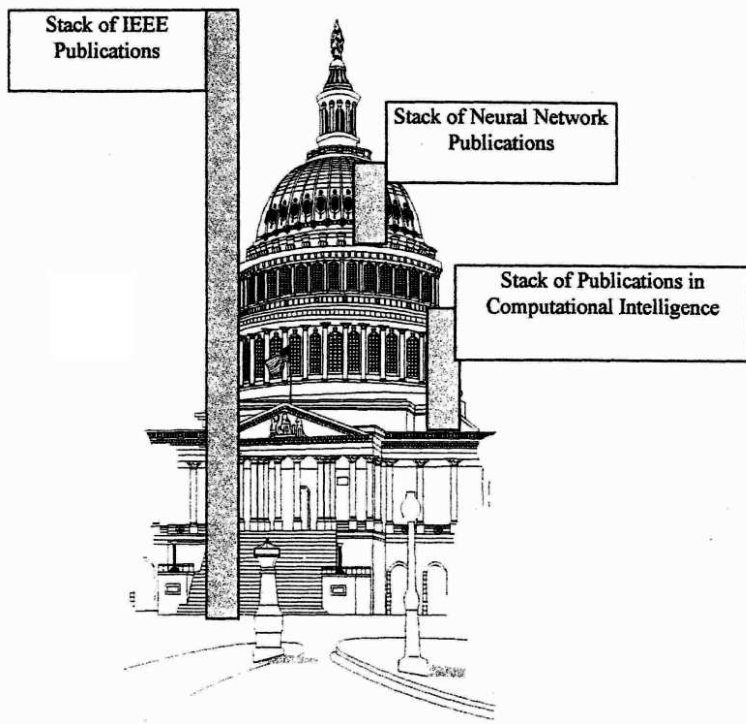


Figure 74: What would happen if publications were stacked by the US Capitol Building? Using the 1993 ICNN Proceedings, 1987 pages equals 4 3/8 inches. We'll assume 5 pages per paper. INSPEC data gives the results shown here for 1996. (Reprinted from [30]).

convention, *Scientific American* reports that the Internal Affairs Department of the Chicago Police Department used a neural network to classify 'bad cops' who might provoke conflict [38].

"The (neural network) program forecasts whether each of the 12,500 officers on the force is likely to behave in a manner similar to nearly 200 colleagues who were dismissed or resigned under investigation during the last five years for actions ranging from insubordination to criminal misconduct."

A total of 91 officers were identified. The results were challenged by the police union. A ruling banning the use of the neural network results was made because of lack of causality, *i.e.* the neural network was a "black box" that offered no *explanation facility* [30].

- June 2: The NNC AdCom meets in Washington DC.
 - ▶ A proposal is approved for IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION. David B. Fogel chaired the proposal committee

and will serve as the first EIC. The first issue is published in 1997. (See Figure 75.)

- ▶ Elections for 1996
 - James C. Bezdek, President
 - Piero Bonissone, VP Finance
 - Jack Zurada (University of Louisville), Executive VP
 - Wesley Snyder, VP Publications
 - ▶ TNN Outstanding paper awarded to Jianchang Mao and Anil K. Jain [22].
 - ▶ Fuzzy Pioneer Award, TFS best paper award, and EC Pioneer Award are approved by the NNC AdCom.
- September 7-11: FUZZ-IEEE is held in New Orleans (See Figure 76).
- ▶ Conference Committee
 - Fredrick E. Petry (Tulane University), General Chair
 - Donald Kraft (Louisiana State University). Program Chair
- RIGS: Unlike IEEE Societies, IEEE Councils cannot have local Chapters. The NNC, therefore, instituted *Regional Interest Groups* (RIGS). In 1996, the NNC has RIGS in Research Triangle North Carolina, London, Korea, Seattle, and Spain. Australia boasts of four RIGS: in Salisbury, Perth, Victoria, and Queensland. (See Figure 77.)

Appendix: April 9, 1992: From Whence the Term *Computational Intelligence*?

What is the name of the new field that subsumes neural networks, fuzzy systems and evolutionary computing? In early 1992, the working term is *intelligent systems*. No one is really in love with the name. It carried baggage from the AI field and was already in use in other contexts.

Here is the email dated April 9, 1992 from James C. Bezdek that first suggested the name *IEEE Computational Intelligence Society*.²³ Robert J. Marks quickly followed by suggesting the upcoming NNC world congress be dubbed the *World Congress on Computational Intelligence* (WCCI). Here is, verbatim, a portion of an email exchange on the topic of a new name for the NNC. The participants in the exchange are Patrick K. Simpson, Russel C. Eberhart, Toshio Fukuda, Roy S. Nutter and Robert J. Marks.

- The original idea: April 9.

²³The term *Computational Intelligence*, apparently first coined by Gordon McCalla and Nick Cercone, has been used as a title for another conference series and a journal [45].

Announcement and Preliminary Call for Papers IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION

Forthcoming May, 1997

The IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION will publish archival journal quality original papers in evolutionary computation and related areas, with particular emphasis on the practical application of the techniques to solving real problems in industry, medicine, and other disciplines. Specific techniques include but are not limited to evolution strategies, evolutionary programming, genetic algorithms, and associated methods of genetic programming and classifier systems. Papers emphasizing mathematical results should ideally seek to put these results in the context of algorithm design, however purely theoretical papers will be considered. Other papers in the areas of cultural algorithms, artificial life, molecular computing, evolvable hardware, and the use of simulated evolution to gain a better understanding of naturally evolved systems are also encouraged.

Papers must conform to IEEE standard submission guidelines which are available in IEEE TRANSACTIONS (for example, see the IEEE TRANSACTIONS ON NEURAL NETWORKS or the IEEE TRANSACTIONS ON FUZZY SYSTEMS). Those wanting to receive an author's information booklet from the IEEE can request this at trans@ep.ieee.org.

Six (6) hard copies of the manuscript should be sent to:

David B. Fogel
Editor-in-Chief
IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION
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La Jolla, CA 92037 USA

The Editor-in-Chief will be pleased to comment on the suitability of other submissions at the request of the authors. Further questions can be directed to d.fogel@ieee.org.

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Figure 75: IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTING call for papers.



Fifth IEEE International Conference on Fuzzy Systems New Orleans, September 8-11, 1996

The Fifth IEEE International Conference on Fuzzy Systems (FUZZ-IEEE'96) will be dedicated to the discussion of advances in:

- Basic Principles and Foundations of Fuzzy Logic
- Relations between Fuzzy Logic and other Approximate Reasoning Methods
- Qualitative and Approximate-Reasoning Modeling
- Hardware Implementations of Fuzzy-Logic Algorithms
- Design, Analysis, and Synthesis of Fuzzy-Logic Controllers
- Learning and Acquisition of Approximate Models
- Relations between Fuzzy Logic and Neural Networks
- Integration of Fuzzy Logic and Neural Networks
- Integration of Fuzzy Logic and Evolutionary Computing

• Applications to:

- System Control
- Intelligent Information Systems
- Case-Based Reasoning
- Decision Analysis
- Modeling
- Databases and Information Retrieval
- Signal Processing
- Image Understanding
- Pattern Recognition
- Robotics and Automation
- Intelligent Vehicle and Highway Systems
- Virtual Reality

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Figure 76: FUZZ-IEEE 1996

IEEE NNC Regional Interest Groups		
STEPHEN AYLWARD Univ. of North Carolina NC Triangle Area aylward@cs.unc.edu	M. PALANISWAMI The University of Melbourne Victoria, Australia swami@ec.mu.oz.au	MYUNG WON KIM Korea Advan. Inst. of Sci. and Technol. Korea mkim@ard.etri.re.kr
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Figure 77: NNC RIGS in 1996.

From jbezdek@trivia.coginst.uwf.edu Thu Apr 9 12:33:11 1992 Received: from blake.u.washington.edu by milton.u.washington.edu (5.65/UW-NDC Revision: 2.22) id AA03242; Thu, 9 Apr 92 12:32:11 -0700 Received: from TRIVIA.COGINST.UWF.EDU by blake.u.washington.edu (5.65/UW-NDC Revision: 2.1) id AA07624; Thu, 9 Apr 92 12:32:06 -0700

Received: from jbezdek.topsnod.uwf.edu by trivia.coginst.uwf.edu (5.64/A/UX-2.01) id AA05828; Thu, 9 Apr 92 13:30:22 CDT

Date: Thu, 9 Apr 92 13:30:22 CDT

Message-Id: j9204091830.AA05828@trivia.coginst.uwf.edu; To: rsn@ece.wvu.wvnet.edu, rce@rti.rti.org, xm8@sdcc12.UCSD.EDU, marks@blake.u.washington.edu, d43131a@nucc.nagoya-u.ac.jp

From: jbezdek@trivia.coginst.uwf.edu

Subject: NEW name of council

Status: R

I suggest the COMPUTATIONAL INTELLIGENCE COUNCIL, later to become the COMPUTATIONAL INTELLIGENCE SOCIETY.

- The context correctly suggests the quest to change the name of the *Neural Networks Council* to the *Computational Intelligence Council*. The true history is that the next name was the *IEEE Neural Networks Society*. Bezdek got it right in steady state, though. The name we now use, the *IEEE Computational Intelligence Society*, was coined in his email.

In response to Bezdek's email, Eberhart is the first to endorse the new term.

From rce@rti.rti.org Thu Apr 9 19:36:52 1992

Received: from blake.u.washington.edu by milton.u.washington.edu (5.65/UW-NDC Revision: 2.22) id AA10804; Thu, 9 Apr 92 19:36:49 -0700 Received: from rtifs2.rti.org by blake.u.washington.edu (5.65/UW-NDC Revision: 2.1) id AA15621; Thu, 9 Apr 92 19:36:40 -0700 Received: by rtifs2.rti.org (5.57/RTI/2-27-90) id AA01224; Thu, 9 Apr 92 22:35:23 -0400 Received: by babar.rti.org (5.57/RTI/9-21-87) id AA14498; Thu, 9 Apr 92 22:35:08 -0400

Date: Thu, 9 Apr 92 22:35:08 -0400

From: Russel Eberhart jrce_babar@rti.rti.org;

Message-Id: j9204100235.AA14498@babar.rti.org;

To: d43131a@nucc.nagoya-u.ac.jp, jbezdek@trivia.coginst.uwf.edu, marks@blake.u.washington.edu, rce@rti, rsn@ece.wvu.wvnet.edu, xm8@sdcc12.UCSD.EDU xm8sdcc12.UCSD.EDU

Subject: Re: NEW name of council

Status: RO

I like Jim Bezdek's suggestion of Computational Intelligence Council very much, despite the somewhat sick (sic) acronym. I think it's more descriptive than "intelligent systems", both words of which are a little overworked. As of now, CIC has my vote.

- The obvious next step was use of the term *computational intelligence* to the clustering of three major conferences in a single venue. The previous working title was *IEEE World Congress on Intelligent Systems*. It was replaced on April 12, 1992 with WCCI by Robert J. Marks.

From marks Sun Apr 12 00:02:46 1992
 Received: by milton.u.washington.edu (5.65/UW-NDC Revision: 2.22) id AA20916;
 Sun, 12 Apr 92 00:02:09 -0700 Date: Sun, 12 Apr 92 00:02:09 -0700
 From: Robert Marks jmarks@u.washington.edu
 Message-Id: j9204120702.AA20916@milton.u.washington.edu
 Sender: marks@milton.u.washington.edu
 To: 70750.345@compuserve.com, d43131a@nucc.cc.nagoya-u.ac.jp, jbezdek@uwf.bitnet,
 rce@rti.rti.org, xm8@sdcc12.ucsd.edu
 Subject: Name Change

Cc: marks, rsn@a.coe.wvu.wvnet.edu Status: R

Following Jim's suggestion (which I like more & more the more I think about it), we should change the 94 cluster meeting to: 'The IEEE World Congress on Computational Intelligence'
 (ohhhh ... I just had a shiver)

Bob

At this writing (August 2009), "computational intelligence" gets about 727,000 hits on Google, 114,000 on Google Scholar, 4,400 hits on Amazon.com books, and 12,000 hits on IEEE Xplore.

Appendix: Lists

- AL

- ▶ AL: Acronym List
- ▶ AdCom: Administrative Committee
- ▶ Cal Tech: California Institute of Technology
- ▶ CASSIS: Classification and Search Support Information System
- ▶ CIFE: Computational Intelligence for Financial Engineering
- ▶ CIS: Computational Intelligence Society
- ▶ CFP: Call for Papers
- ▶ EIC: Editor-in-Chief
- ▶ ExCom: Executive Committee
- ▶ Fuzz-IEEE: International Conference on Fuzzy Systems

- ▶ IAFE: International Association of Financial Engineers
- ▶ ICEC: IEEE Conference on Evolutionary Computing
- ▶ ICNN: International Conference on Neural Networks
- ▶ IEEE: Institute of Electronic and Electrical Engineers
- ▶ JPL: Jet Propulsion Lab
- ▶ FUZZ-IEEE: IEEE International Conference on Fuzzy Systems
- ▶ IJCNN: International Joint Conference on Neural Networks
- ▶ INNS: International Neural Networks Society
- ▶ IUPUI: Indiana University, Purdue University at Indianapolis
- ▶ LEOS: IEEE Laser and Electro-Optics Society
- ▶ IEEE: Technical Activities Board
- ▶ INNS: International Neural Networks Society
- ▶ NC: North Carolina
- ▶ NNC: Neural Networks Council
- ▶ NNCom: Neural Networks Committee
- ▶ ONR: Office of Naval Research
- ▶ RIG: Regional Interest Group
- ▶ RNNS: Russian Neural Network Society
- ▶ SRI: Stanford Research Institute
- ▶ TEC: TRANSACTIONS ON EVOLUTIONARY COMPUTING
- ▶ TFS: TRANSACTIONS ON FUZZY SYSTEMS
- ▶ TNN: TRANSACTIONS ON NEURAL NETWORKS
- ▶ UC: University of California
- ▶ UCLA: University of California Los Angeles
- ▶ USC: University of Southern California
- ▶ VRAIS: Virtual Reality Annual International Symposium
- ▶ WCCI: World Congress on Computational Intelligence
- ▶ WWW: World Wide Web
- ▶ VP: Vice President

■ NNC Presidents. In 1987, the IEEE Technical Activities Board (TAB) approved formation of the IEEE Neural Networks Committee. TAB approved promotion to the IEEE Neural Networks Council in 1990 and to the IEEE Neural Networks Society in 2002.

1. 1987: Troy Nagle
2. 1988-91: Robert J. Marks II

3. 1992-93: Russell Eberhart
4. 1994: Patrick K. Simpson
5. 1995-96: Walter Karplus
6. 1997-98: James C. Bezdek
7. 1998-2000: Clifford Lau
8. 2001: Enrique Ruspini

■ NNC Neural Networks Pioneer Awards

- 2002 Terry Sejnowski
- 2001. David E. Rumelhart and James L. McClland
- 2000. Leon Chua
- 1999. Robert Hecht-Nielsen
- 1998. Geoffrey E. Hinton
- 1997. John J. Hopfield
- 1995. Michael A. Arbib
- 1995. Nils J. Nilsson
- 1995. Paul J. Werbos
- 1994. Christoph von der Malsburg
- 1993. Thomas M. Cover
- 1992. Shun-Ichi Amari
- 1992. Walter Freeman
- 1992. David J. Willshaw
- 1991. Bernard Widrow
- 1991. Steven Grossberg
- 1991. Teuvo Kohonen

2 Appendices

Here is my personal account on some of the transnational activities during the early days of the IEEE Computational Intelligence Society.

2.1 Marks on Marx on Rostov on Don

The RNNS/IEEE Symposium on Neuroinformatics and Neurocomputing was held in Rostov-on-Don in Russia from October 7 through October 10, 1992. I flew into Moscow with Wes Snyder of Bowman Gray School of Medicine who served as the Symposium Program Co-Chair (the most demanding position in the conference) and Dmitry Kaplan of Quantum-Siemens, who was the Finance

Chair (the second most demanding position). Dr. Witali Dunin-Barkowski of the Neurocybernetics Research Institute, Rostov State University, Russia, served as the conference's General Chair. I was the International Chair.

The Moscow airport appeared glum, gray and gloomy. Uniformed immigration officials sat in bleak glass cages with "do not bribe the officials" signs on them. I had read that officials had been requiring tourists to pay money to pass. The signs were a response of the government to dishonesty. Honesty is always impressive. The official looked at my passport photo taken six years earlier when I had a beard and longer hair. He looked at me, crinkled his brow and rubbed his chin - indicating I no longer had a beard. I smiled uneasily, waiting to be tapped on the shoulder by a KGB agent. I made some motions that were supposed to resemble shaving and smiled meekly. Confrontation was to be avoided at any cost. Later, as I learned more about the people, I became quite comfortable in Russia. Their culture remarkably resembles that in the United States. At the airport, though, my impressions were based on my vast experience of Russian culture based on Dr. Zhivago, the Cuban missile crisis, and H-bomb drills they made me do in grade school. The immigration official put the card down, and did nothing. Nothing. For about half a minute. Later I found out that some Russian workers do this to kill time so they don't have to work hard. My visa was stamped and I was waved through.

Immediately inside the airport terminal, there was a cluster of about fifty people, some holding signs with people's names on them. The group was divided by an aisle traveled by newly arriving passengers. There was no sign for us. We retrieved our luggage and stacked it in a safe place. While Wes and Dmitry stood guard, I returned to the crowd and began to look for the sign from the side. People were packed, groping to see the new arrivals. I was pushed from behind with a number of short abrupt bumps. Somewhere, I had learned to associate this with pick pockets. Sure enough, when I focused attention, there were fingers doing a dance around my posterior cheeks. I swung around and came eye to eye with the pick pocket. I glared at him. He froze, turned his head, walked away, stopped, looked at me, gazed away, fidgeted, pulled out and lit a cigarette, looked at me, turned, and walked away - a classic study on how to look guilty.

Wes had found our ride. Our driver was accompanied by Dr. Dunin-Barkowski's wife whose name was also Dr. Dunin-Barkowski. She lives in Moscow and is an MD, but speaks little English. Dmitry, though, speaks native Russian. He was born in Kiev and immigrated to the United States as a teenager. The trip would have been incredibly awkward without Dmitry. He confided that his return to Russia, the first after his immigration, was done with apprehension. Although he intellectually knew there would be no problem, his memories of the oppressive Soviet system were deeply rooted.

The next day we flew Aeroflot from Moscow to Rostov-on-Don. The only good news was that smoking was banned on the airplane and we arrived safely. In an apparent move to cut costs, Aeroflot planes have no oxygen masks. The floors of the plane are made of wood overlaid with a peeling rubber floor cover. Aeroflot also has no enclosed overhead bins. Carryons are placed in an open



Figure 78: Left to right: Dmitry Kaplan, Witali Dunin-Barkowski, Wes Snyder, Boris M. Vladimirsky and me in front of the A.B. Kogan Institute for Neurocybernetics at Rostov State University. Witale is the director.

rack above your head - the kind you would find on a bus. Most airlines require enclosure. In turbulence, falling luggage can really hurt.

The refreshment on our short flight was club soda served in a plastic bowl. In Europe and Russia, mineral water comes with or without “gas”, meaning CO₂ bubbles. The smell of some kind of soup was in the plastic of the bowl that held my colorless soft drink - probably the aura of refreshment from some previous longer flight. It added flavor to the otherwise tasteless mineral water.

Rostov is a city of about a million people. We were met at the airport by Witale and some of the local arrangement volunteers on the organizing committee. Witale is a delightful man, full of energy and prone to eruptions of deep guttural laughter. He is fun to be with.

I first met Witale in Seattle. When I served as President of the IEEE Neural Networks Council, we hosted a Presidents Dinner at our annual meetings. Witale, as President of the RNNS, attended this dinner at the 1991 Seattle IJCNN (International Joint Conference on Neural Networks). With Wes Snyder and Dmitry Kaplan, we put together the Rostov Symposium and got it approved by the Council. Witale later returned to the United States and, in order to work out the details of the conference, stayed with the Snyders in North Carolina. During his visit, the attempt was made to kidnap Gorbachev and overthrow the government of the Soviet Union. There was apparently no connection between

this and Witale's visit.

Our Rostov hotel was nice. Each floor of the hotel was graced by a "key lady" who sat at a desk close to the elevator. It was her responsibility to guard your key when you left (if you wanted her to) and sell you sundries, such as cigarettes and mineral water (with and without gas). A key lady was on duty 24 hours each day.

Breakfast at the hotel was great. Three of us had a breakfast of rice pudding, scrambled eggs, sausage, grape juice and coffee for 34, or about 11 each. I graciously agreed to pay, under the condition that Dmitry pick up the lunch tab in Copenhagen on our way home. The low price was due to the weak ruble. When Dmitry was a boy in Kiev, a Ruble was worth about a dollar. During the conference in Rostov, \$1 cost about 360 rubles. About a month later, it cost 400 rubles. In 1992, a professor in Russia made about \$160 per year. It has gotten worse.

The conference was great. I learned a few things about technology and a number of things about Russian people. On the first day, we held the opening ceremonies with greetings from the mayor, conference chair, etc. Due to the dominance of American technology, English is the official language of all international technical conferences. This was the first meeting in English that had been held in Rostov this century, or, for that matter, ever. At the opening ceremony, Witale feverishly translated the comments of the Russian speakers into English and the English speakers into Russian. During my stay at the podium, I gave the obligatory positive remarks about the conference. I then related a story, not original, about the common labeling those who knew many languages as "multilingual". Similarly, those who knew two languages were referred to as 'bilingual' whereas those knowledgeable of only one language are known as "Americans." Witale gazed up, searching his memory bank for equivalent Russian words as he translated in parallel. At international conferences, I have found a mild and reserved resentment of the forced English language. Properly conveyed self depreciating humor can transform this into good natured back-slapping collegiality. The audience laughed at the Russian translation and many smiling heads bobbed, acknowledging truth in the humor.

In the middle of the ceremonies, I was whisked outside to be interviewed on a local television station, Rostov TR (television-radio), Channel 2. A young English professor from Rostov State served as the translator and stood between me and the Russian speaking reporter. We stood in the sunlight on the entrance to the convention sight in front of a cameraman. Only benign questions were asked, and I gave standard diplomatic answers. "What are neural networks?", "Why is this conference being held in Rostov?", "What do you think of Russia?". Watching the interview on television later was strange. They only aired the last few words of my eloquent response to the questions. Then the translator would talk at length in Russian to the reporter. The reporter then asked a prolonged question in Russian. The translator turned to me and only got out about half a sentence in English. Cut to me giving the last half sentence of my response. They had, for reasons now obvious, edited most of the English out of the interview. Almost none of their audience spoke English.

The Russian Neural Network Society (RNNS) is one of many national professional neural networks societies. There is also the ENNS (Europe), ANNS (Australia), SNNS (Swiss), JNNS (Japan) and the CNNC (China Neural Networks Council). At the Rostov Symposium, I met Dr. Aleksander F. Lavrenjuk, President of the Siberian Neural Networks Society. Dr. Lavrenjuk is with the Tomsk Polytechnical University and is doing research on implementation of neural networks using neutron beams. He was specifically interested in whether the IEEE Transactions on Neural Networks, a publication of the IEEE Neural Networks Council, would be open to publish such research. (It is). I whimsically asked if he was doing any research in applications of superconductivity to neural networks. In Siberia, I smiled, it could be done outside. He smiled politely and gave a polite and obligatory chuckle. He had probably heard this and similar Siberia jokes hundreds of times. We continued to talk for quite some time. The caricatured view I had was irreversibly changed. (Although I did I learn that, in Siberia, milk is delivered to your front porch in large unwrapped frozen blocks.)

The conference banquet was a fascinating example of the importance of alcohol in Russian culture. An associate director of Witale's lab, Boris M. Vladimirsky, arose, and introduced Westerners to a Russian tradition. Witale translated. Throughout the banquet, toasts would be offered at intervals of ten minutes. Intervals shorter than this were not acceptable. The time between toasts was to be used to coat the stomach with food, so that more alcohol could be consumed. He made a toast to the conference, drank, and sat down. Around the banquet tables were numerous bottles of Russian vodka and champagne. As a nondrinker, I filled my glass with some queer tasting Russian mineral water and joined in the toast. As forecast, the MC rose again in ten minutes. Witale hurriedly chewed and swallowed as to not be late in the translation of the toast. The MC said that he was sorry that he did not know English, but was proud to learn this day that, as a result of knowing only one language, he was an American. A toast was offered and nearly all drank. Ten minutes later, Witali offered a toast in English, and did his own translation. Ten minutes later, Wes Snyder was called upon to offer a toast to the conference and friendship of Russians and Americans. The next toast, it turned out, was mine. As a nondrinker, I tried to shrug it off. Witale insisted. I stood, hoisted my glass, and bellowed "To sobriety!". By his expression, it was clear that Witale did not know the English word "sobriety". He bent, and Dmitry whispered Russian in his ear. Witali smirked, stood tall, raised his glass and gave the translation. There was a smattering of chuckles as many drank to sobriety. This toasting lasted long into the night.

The next night, there was a reception. I talked at length with a Russian researcher whose name I do not recall. He lamented that, since the passing of the cold war, it had becoming increasingly difficult for him to find the funding to support his work in artificial neural networks. I told him the same thing was happening in the United States. Defense budgets were being reduced, and previously strong funding programs were being cut. He slapped me on the back, and said with his thick Russian accent, "Yes. It was much better when we were trying to blow each other up". He laughed at his own black humor and

I involuntarily chortled.

The Americans at the conference were asked to talk to the Deputy Chief of Rostov Region Administration, Mr. Aleksei A. Khomyakov. There were about a dozen of us. Mr. Khomyakov is kind of the CEO of Rostov. He made a presentation on the attributes of the Rostov region and its willingness to interface with American business. This attitude of business cooperation willingness seems prevalent throughout Russia.

One of the most interesting people I met at the conference was Dr. Alexander I. Galushkin, Director of the Scientific Centre of Neurocomputers in Moscow. There are a number of cases where technical concepts have been developed independently in parallel in the United States and the former Soviet Union. The work of Dr. Galushkin and his institute is an example of this. He was training multi-layer perceptrons in the early seventies, long before they became popular in the west. His implementation of neural networks optically and with transputers is quite impressive. His work needs to be studied and placed properly in the young history of artificial neural networks.

A “fresh air” conference session was held aboard a boat that sailed down the Don river. The Don is said to separate the European and Asian continents.

Corners of the ship were roped off for a number of parallel technical sessions. I wandered around the boat catching portions of different talks. One scene was quite curious. A Russian researcher was giving his paper in broken English. Listening were a half dozen Russians, each straining to understand the speaker. (I snapped the picture reproduced in Figure 79.) It occurred to me that this was proof positive that the cold war was, indeed, over.

The boat docked, and we all debarked. We formed a loose line, and walked about a half a mile to see a Russian church in the middle of restoration. The countryside was great. There were sheep and goats and old Cossack buildings. Two older ladies, who sat on a bench outside of a barn, were living caricatures of Russia, with their head scarves, multi layers of sweaters and chubby dome-like figures. I took their picture. They looked up and said something. Dmitry, who was with me, said something back. We continued to walk down the path and Dmitry explained, ‘They asked why we were taking their picture. They said they have nothing.’

When the conference ended, we flew Aeroflot back to Moscow. Witale’s aunt, Natalia (translated Natasha) Kucherov picked us up at the airport with our driver. We spent the day taking a fantastic tour of Moscow, including the Kremlin, Red Square, and other tourist magnets. The Kremlin now charges admission. The sixtysomething lady in the booth selling tickets took our money, and, like the man at the airport, did nothing for about thirty seconds. I have had similar service in American post offices.

The highlight of my trip was dinner at Natasha’s apartment with Wes, Dmitry and Natasha’s family. The apartment was in one of the countless high rises built around Moscow. The architecture, like most buildings built in Russia this century, is gloomy. The apartment building looked like it had been built in the 1950’s. It also looked quite neglected. As we pulled in the building’s parking lot, a half dozen men standing around a hole in the ground, glared at



Figure 79: Russians giving papers in English to other Russians.

us. Although dressed in work clothes, none of them were working. We entered the building and climbed the stairs - there were no elevators - to Natasha's apartment. Inside the apartment, the atmosphere was totally different. Although small, the apartment was filled with the warmth of a home. Natasha's teen age son was there. He had been practicing his English, and we talked a bit. We were soon joined by Natasha's husband, Anatoly. We later learned he had spent the morning looking for tomatoes for our lunch. Anatoly is a computer programmer who is working for a new private company specializing in optical pattern recognition. Natasha was working to establish a Christian school in Moscow, and asked Dmitry to mail some fund raising material for her in the States. There is currently a greater freedom of religion in Russia than the United States. Actions, for example, have been levied against the University of Washington's chapter of Campus Crusade for Christ because the organization does not conform to some modern concepts of political correctness. Christianity and other religions, on the other hand, are discussed openly and embraced in Russian education and government institutions. Natasha's attempt to open a private Christian school in Moscow was impressive. She and Anatoly had been secret Christians throughout the rule of intolerant atheistic communism. Anatoly told me in broken English that "Russia has lived too long without Christ."

The lunch was splendid. Natasha fixed a turtle cake, which looked like a bunch of pancakes sprinkled with powdered sugar stacked in a mound. ("Turtle"



Figure 80: Me and some sheep on the Rostov countryside. (I'm on the right).

refers to shape rather than content). Sometimes, Dmitry said, turtle heads were fashioned out of a pancake and added to complete the image. We talked continuously over lunch. Poor Dmitry didn't get much of a chance to eat. He was the only always translating. The time spent at the Kucherov's was warm and open. Except for the language difference, it was like visiting old friends in America.

Natasha and the driver later drove us to the Moscow airport for our evening flight to Copenhagen. (No, Dmitry did not buy me lunch there). We were home in two days.

During his visit to Seattle, Witale said, in regard to the government of the former Soviet Union, "They lied to us about America. They lied to us". In describing his feeling about his home in Kiev, Ukraine, Dmitry taught me "There is a difference between love of country and loving your government". Despite formerly oppressive rule, Russian people are wonderful and more American in their culture than many realize.

Most, for example, know only one language.

2.2 **When Sumos Fly**

It hit me clearly for the first time that Japan was truly different from America. The traditional Japanese breakfast was placed before me. Fish and eggs - both raw. Then there were the other things.

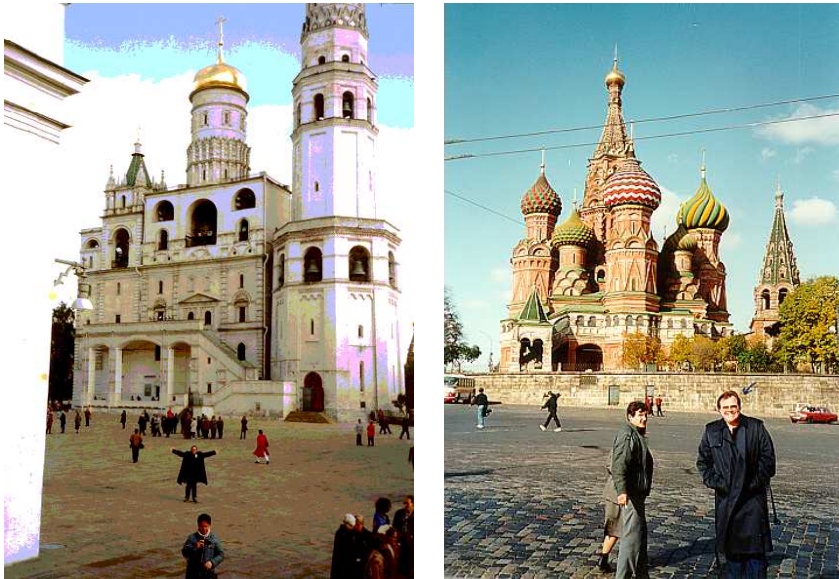


Figure 81: LEFT: Expressing my exuberance in the Kremlin complex. Why is everyone walking away? RIGHT:Me (I drew an arrow to help with identification) in front of those famous onion topped buildings at the Kremlin in Moscow.

Russ Eberhart, the Vice President of the IEEE Neural Networks Council (NNC), and I, the President, were in Tokyo to settle a problem caused by a Japanese-American cultural misunderstanding. The NNC was sponsoring a major conference in Japan (The International Joint Conference on Neural Networks). We had approached the problem in an American way. A highly visible, energetic internationally visible hot shot was chosen to be the Chair of the conference. The person we chose, Toshio Fukuda, was the youngest person to ever be appointed the rank of full Professor at an imperial university in Japan.

Toshio is a continuing explosion of creative and political energy. He is also politically and socially savvy. Toshio claims that, to westerners, the faces of Japanese men look younger than their true years. He thus sports a full jet black beard to make him look older. Toshio travels to the United States numerous times each year. He has three homes. One is in Tokyo where his wife and children live. The second is in Nagoya near his University. The third is aboard Northwest Airlines.

Choosing a young energetic ball of fire like Toshio to lead a major event is not the way things are done in Japan. There, all the people working in the field of the conference are lined up and their wrinkles counted. The one with the most wins. When young Toshio is named, we hear loudly from Professor Sun- Ichi Amari's subordinates. Amari is the most senior researcher in neural



Figure 82: LEFT: Wes Snyder, me and Dmitry Kaplan in front of the Tsar's Cannon at the Kremlin in Moscow. This is suppose to be the world's largest cannon RIGHT: Moscoe Stae University is enormous. Take a look at how diminutive me traveling buddies are. (Dmitry is on the left.)

networks in Japan. (His work is also outstanding.) It is highly improper and undignified for the Dr. Amari to express his outrage at the support of Fukuda directly. His pawns serve this purpose. We are told in no uncertain terms: if Amari hexes the conference, the important researchers in Japan will not attend. The conference will be a failure. This is the problem Russ and I face.

Jet lag wakes me well before sunrise. We are staying at the Ginza Da Ichi hotel in the Ginza district of Tokyo. The cost is \$180 per night for a room smaller than a Motel 8 - for that matter a Motel 2. The room is hot and muggy. There is no air conditioning and I can't figure how to open the window or operate the telephone. Slippers and a housecoat are provided.. There is also this two foot long shoe horn. Every Japanese hotel I ever stayed at has a two foot long shoe horn. They are great. You can use them without bending over thereby reserving the cardinality of your quota.

Our pre-meeting breakfast is in a small private meeting room in a cute Tokyo restaurant. Russ said I sit at the head of the table to establish that I, as the NNC President, am the big bean curd. We hang the NNC banner behind me. Russ says there are Japanese cultural reasons behind doing this and our guests will be impressed. In they come - Toshio, Dr. Amari and all Amari's lieutenants. The greetings are very un-American. Americans would be formal, apprehensive, stuffy and all business. These guys smile big toothy grins, say greetings with



Figure 83: Bob in front of the Bolshoi Ballet in Moscow.

thick accents and voices that go up and down the tone scale. Their heads and upper torsos bob up and down like members of an unsynchronized aerobics class. The deeper you bow, the more respect shown. The young guys bump their noses on the floor. Russ and I try to emulate the custom - except , with my full boned body, I do not bend well. I bow as low as I can without audible grunting.

Russ said our hosts would be impressed if we ate a traditional Japanese breakfast. They are indeed impressed and even say so. The food doesn't taste that bad. The raw eggs and raw fish are simply hard to look at. As a famous wart hog in Disney's *Lion King* said, "Slimy but satisfying!"

Discussion starts. With a big hospitable grin, I say the conference should be in Nagoya with young Toshio Fukuda as the Chair. Toshio has been appointed by the sponsoring organization and was well qualified for the position. Russ looks at me, smiles, bobs his head in approval and looks around the table, smiles and bobs his head some more. Russ has read this was the proper thing to do. I also nod my head like an idiot when he and Toshio talk. I feel like a toy dog glued on the back dash of a '69 Mustang.

Amari smiles, nods, and says 'yes'. Their nods are not as enthusiastic as ours.

But wait a minute! Hold your egg rolls!

They said 'yes'?

Incredible. I could have made this brilliant fifty second oratory over the



Figure 84: Russ Eberhart and me in Tokyo in 1991 to address a Japanese-American cultural misunderstanding.

phone. Had we wasted a trip to Japan? No. I later learn that saying ‘no’ in Japan is considered rude. When ‘yes’ is said, it means the comment is understood. You could say “You’re so ugly, your mother had to rub raw squid on your face so the dog would play with you” and they would smile, bob their heads, and say ‘Yes, yes’. This didn’t mean that they agree. It meant they had heard what you said and, ‘yes’, your opinion was understood.

Amari says he understands, but the conference would be better if held in Tokyo. All his flunkies smile like this was the greatest thing they ever heard and start with the enthusiastic head bobbing. The implication is that Amari, being the senior neural networks guy from Tokyo, would be the top soy bean. Toshio, from Nagoya, wants the conference in Nagoya.

We end the meeting all smiles, saying ‘yes, yes’, we understand the other guy’s position. The only consensus we have is this was a Japanese problem and needed to be solved by the Japanese. In other words, Toshio and Amari have to meet and work things out. They did. The conference was held in Nagoya with Amari as Chair. Toshio was the ‘Steering Committee Chair’ which is like the head person - but not really. I don’t know if it’s a Japanese saying, but should be.

‘To save face and solve conflicts, obfuscate.’



Figure 85: At the Nagoya IJCNN. Toshio Fukuda, Kunihiko Fukushima, Shunichi Amari, and Bob

2.2.1 Big Foot Sighted in Tokyo

That afternoon, our host, Toshio Fukuda, takes us on the town in Tokyo. Our first stop is a restaurant for lunch. Traditionally, shoes are removed and placed in a secured cubby hole before the dining room is entered. The Japanese apparently have a thing about shoes and cleanliness. At the restaurant, I dutifully remove my shoes and am relieved to note that (a) my socks contain no holes and (b) match. The hostess takes my shoes, says something in Japanese, and bows. She places them in the shoe cubby and tries to close and lock the door. The problem is that I wear a size 13EE. The door to my shoe cubby does not close. She begins a more high pitched and animated monologue in Japanese as she bends the toes of my shoes and forces the door to close. She turns, starts bowing at me and keeps babbling.

Toshio translates. “She is saying I am so very sorry. Please forgive me. This is all my fault. I am so sorry.’ ” Russ laughs.

It really is not that big of a deal.

For lunch, we sit cross legged on the floor in front of a low table. The heels of my feet totally overhang the back of the slippers provided by the restaurant.

In truth, I love Japanese food. I am fond of sushi bars and go often with my son, Jeremiah. The rest of my family stays home. I once tried to make sushi at home. I got some green sheets of seaweed from Safeway and placed them flat on the chopping block. Freshly cooked sticky rice was placed on



Figure 86: Bob in front of the Nagoya castle.



Figure 87: Some of the organization committee at the 1993 Nagoya IJCNN. Can you find the round-eyes?

top. When I smoked, I occasionally rolled my own cigarettes. Making sushi, I reasoned, couldn't be that much different. I was afraid of using raw fish purchased at Safeway for my sushi, so I bought a couple cans of cooked sardines - packed in fresh spring water. My sushi, for some reason, was about three times the diameter of normal sushi. Because I used warm rice, the seaweed became rubbery. Not even Jeremiah liked it. I ended up eating it all as a matter of pride. I don't make sushi anymore.

I explained to one of Toshio's students the dislike of sushi by some Americans. Were there any American foods that repulsed Japanese? His response was immediate.

"Cheese"

For some reason, he was repulsed by the idea of eating the waste discharge of milk eating bacteria.

In the evening after the nonconfrontational confrontation, Russ, Toshio and I go to a classy Japanese restaurant and eat shabu-shabu. Shabu-shabu - what a great Japanese word! It could be used everywhere. You bump into someone accidentally. You turn, smile apologetically, bow and say 'shabu-shabu'. When you put grandma on the plane, you wave as she walks down the ramp. When she turns for that last eye contact, you energize the waving and yell 'shabu-shabu'. The phone rings. You answer with a friendly 'shabu-shabu.' Here is what it really means. A boiling pot of water is placed in the middle of the table on sterno fire. Using chop sticks, thinly sliced pieces of beef are dipped into the bubbling water. Once cooked, the beef is dipped into a yummy sauce and eaten. After a lot of beef is cooked, the water becomes a tasty broth. The waiter brings vegetables and other goodies and makes soup. It is very good. Dessert was green tea ice cream. I know the place is classy because Toshio pays



Figure 88: Me making rubbery sushi.

over \$1000 (in yen) for the three of us. The meal is the most expensive I have ever eaten. Shabu-shabu.

Conversation over dinner is a wonderfully pleasant international passtime. I ask Toshio a question most westerners (like me) can't answer but often ponder. Can a Japanese person look at a Chinese person and tell by appearance the man is Chinese? Or Korean? I can't tell the difference. Toshio's explanation is great.

"Can you tell the difference between a Swede and a German?"

I tell him "Sometimes".

"Same thing," he says. "When they speak, though, I know their nationality immediately."

"Same thing with the Swede and the German," says I.

"Exactly. You know," he smiles. "You Europeans all look the same to me."

2.2.2 The Conception of FUZZ-IEEE

Japan is the birthplace of fuzzy logic applications. The discipline has lived controversially in western journal papers since 1965 when American Lotfi Zadeh published his seminal paper. The Japanese put this controversy to rest (at least for sensible people) by successfully applying fuzzy logic technology to items from rice cookers to bullet trains. Arguing with success is futile.

I first hear of the Japanese technical revolution from Bernie Widrow, a pioneer in neural networks (e.g. the Widrow-Hoff algorithm) and former President of the International Neural Network Society. Bernie said the Japanese fuzzy technology was awesome and if we (the United States) didn't do anything, the Japanese would dominate the world's business in fuzzy logic applications.

Russ, Toshio and I discuss this during breakfast at the Ginza Da-Ichi Hotel lobby cafe in Tokyo. It is the morning after shabu-shabu night. I am the President of the IEEE Neural Networks Council, Russ is vice-president and Toshio is the Secretary. The NNC had recently started an NNC Forum Series where minor workshops could be sponsored by the NNC in areas related to neural networks. Russ has long favored having an NNC forum on fuzzy logic and neural networks. At that breakfast meeting, over green tea and tofu bean soup, we decide a major international fuzzy conference is needed. The IEEE Neural Networks Council will sponsor.

But who will be the lead person and where will the conference be held?

Toshio has done work in fuzzy systems and is well connected with the Japanese community. Toshio says, though, that the first conference should be held in the United States. Even though the Japanese are a formidable technical force, the United States still dominates the world in technical presence and status. Neither Russ nor I know enough about the topic or the major players to be top dog in the United States. The only NNC officer who isn't at the breakfast was the Treasurer, Patrick K. Simpson. Pat had done a lot of recent work in fuzzy systems. He had the drive and the knowledge to pull this off. It is settled. Patrick will be the first Chair of the IEEE International Conference on Fuzzy Systems. Russ, Toshio and I are excited! When I return to the States, I call Pat and tell him why he should be excited too. The problem was, after the high of the flattery faded and after Pat realizes he will be doing all the work, he decides to decline the offer. In retrospect, Pat's decision is wise. The first Chair should be a well connected experienced fuzzy guy.

Pat calls Jim Bezdek, an endowed Professor at the University of West Florida. Jim also used to work at the Boeing High Tech Center. None of us know him but he was quoted in a recent IEEE Spectrum article about fuzzy systems. To say that Bezdek was enthusiastic is like calling Einstein smart. He had approached other IEEE organizations about sponsoring a fuzzy conference and had gotten nowhere. All that was left was to tell Jim IEEE rules and get out of the way. Jim is well connected. He knows all the main fuzzy guys and gets them all to participate by convincing them this is their one chance to get a toe hold in the prestigious IEEE. Bezdek coins the phrase FUZZ-IEEE as shorthand for the IEEE International Conference on Fuzzy Systems. It is the best short title for a conference ever conceived. The first FUZZ-IEEE at the Town and Country in San Diego in 1992 was a monumental success. Four years earlier, the same location hosted the first of neural networks' biggest annual conference - the IEEE International Conference on Neural Networks (ICNN). Now, FUZZ-IEEE is the largest international conference on the topic. Toshio got his chance to Chair FUZZ-IEEE in Yokohama, Japan in 1995. It was the largest fuzzy conference ever held in Japan.

Fuzzy guru Jim Bezdek went on to be the founding Editor of the IEEE Transactions on Fuzzy Systems. I first suggested the idea to him in a phone conversation. The IEEE ICNN conference sequence had spawned the IEEE Transactions on Neural Networks. It only made sense the successful FUZZ-IEEE conference should also spawn a journal.

“You bet. Tell me what to do,” was his response.

I had been on the committee that drafted the proposal for the IEEE Transactions on Neural Networks. Herb Rauch, the founding TNN Editor, was the Chair. I sent Jim a copy of the documents, told him the hoops he had to jump through and got out of the way. The proposal went through IEEE flawlessly. The journal now has a circulation exceeding the combination of all other fuzzy journals.

2.3 Bow Bow Black Sheep

I learn more about Japanese business practices during my second visit there two years later in 1992. Business cards in Japan, for example, are necessary for formal introduction. There is a ceremony in their exchange. The junior guy goes first. He holds his card upside down with both hands at waist level in a half bow so the senior guy can read it. The senior guy accepts the card and examines it. It is proper that something be said concerning the card, like “So. You are the head tuna man at the Yokohama fish works.” Placing the card in your wallet and then in your back pocket is an insult. You are, in essence, mooning the card. When seated, one good idea is to place the cards in the same geometry as those seated at the table. Remembering names no longer is a problem.

After the senior guy properly accepts the card of junior, the roles in the ceremony are reversed. The ceremonial introduction is now complete.

The first time this ceremony was appropriate for me was when meeting Isao Idota, the Executive Director of the Japan Technology Transfer Association. First, Idota’s lowest flunkies come in. All are dressed in thousand dollar suits and starched shirts. Most have apparently never experienced a bad hair day. We go through the ceremony, one at a time. Some do not speak English and have cards that are totally in Japanese. I smile until my dimples cramp, letting them know I think they are the neatest guys in the world since Hirihito. They smile back and bow like crazy. Finally, it is time for Idota. Since he is the senior samurai, I get my card ready, bow slightly, and ready myself for the ceremony. No way. Idota comes through the door with a brisk confident pace. His right hand is outstretched for a handshake as he says in a resonant enthusiastic booming voice “Bob Marks! Good to meet you!” Obviously, Idota was much better practiced in American customs than I was in Japanese.

We have a Chinese dinner that night. There are a bunch of hot shots sitting around the dinner table. Besides Idota, Fukuda and me, Harold Szu, President of the International Neural Network Society (INNS) was there. (Szu is pronounced as in “A boy named Szu”.) Dr. Szu is an American who works for the Navy. Professor Harashima, Dean of the college of engineering at Tokyo University and the mentor of Toshio Fukuda, is also there. Harashima is a pacifist of sorts. He proposes that Japan’s wealth needs to be shared with surrounding third world countries. He also likes the fact that Japan has no army. It is prohibited, I believe, by provisions imposed at the end of World War II. We speak in generalities about the effect of Japan having no army or navy. In a very

uncomfortable moment, Harashima, who until that time had been controlling himself, makes an in-your-face pronouncement.

“The world does not want to see again what the Japanese soldier can do!”

To put this statement in better context, an explanation of oral confrontation in Japan is needed. First, in- your-face phrases in Japan are typically growled rather than spoken. In many instances, the final word or phrase is raised both in pitch and intensity and abruptly cut off at the end.. Phrases are said quickly with pauses between. For example, in growl talk, an insult would be as follows. “I do not want to HURT you! I simply want to run you over with My SUB-URU! And throw off Mount FUJI!” Read this again out loud and emphasize the capitalized words quickly using a growl voice. On the capitalized words, also attempt ejecting high velocity bits of spittle while leaning forward. Any incidental expectorant splats into your opponents face. Your point is made abruptly and effectively! That’s oral Japanese confrontation. (If you desire further explanation, rent a subtitled Japanese action movie, like “The Seven Samurai”. There’s a lot of great growl talk.) At the dinner table, Harashima’s comment, with emphasis, was more like;

“The world does not want To SEE AGAIN! What the Japanese soldier Can DO!”.

A bit of spittle arcs over the table and lands in my shark fin soup. Very intimidating. The statement is followed by awkward silence. Russ Eberhart breaks the silence commenting that now is a good time to exchange gifts.

Exchanging gifts in Japan is traditional. For some reason I don’t understand, gifts should be given in odd numbers. I am rude at this meeting because zero is an even number. Dr. Szu presents Idota a fifth of American scotch. Russ is a bit more culturally clever. He knows many Japanese love baseball. Russ lives in North Carolina - home of the Durham Bulls. A Kevin Costner picture had been made about the Durham Bulls - the most financially successful in minor league baseball. Russ presents Idota with a Durham Bulls baseball. Idota loves it! He rolls in his hands, held it up, looked at it, and smiled.

“This is really it, isn’t it? This is really it!”

Idota beams and rolls the ball some more admiring it like Wimpy with a hamburger. Russ’ present has resonated. Harashima doesn’t speak much more at dinner. I don’t eat my shark fin soup.

How COULD You?!?

On my third trip to Japan, Harashima and I have a polarizing debate about the dangers of America. We sit at a bar at the conference sight of the 1995 FUZZ-IEEE in Yokohama. Harashima has put away a few sake’s. I have chugged four warm club sodas. He is feeling the effects of the alcohol and I the pressure of carbonation. We are ready for a verbal spar.

Harashima started. “I will never come to America again. It is Too DANGEROUS. How could you? When I was the Treasurer of IEEE, I came to America often. Now a Japanese boy is shot when he chooses a wrong house. How COULD you?! This would never happen in Japan. We have no guns. They are OUTlawed. There is no crime in the streets of TOKYO. EVER. How COULD you?!” He liked saying “How COULD you?!” .

I am very supportive of an American's right to own hand guns. It goes with liberty and freedom. (You may not agree - but I bet you have just now abandoned any plans to break into my house.) The Japanese say they have no crime in their major cities because they outlaw guns. It probably has more to do with their homogeneous culture. The First Amendment was not written to protect the rights of target shooters and hunters.

"Guns for peace!" I say!

I lucidly explain to Harashima my philosophy in detail. He orders another sake and, due to my flawless logic, changes the subject.

"Panama. How COULD you?! You invaded Panama, a sovereign country, to kidnap their leader. How COULD you?! How does Japan know you will not do this to Japan. This is bad. Very BAD."

Harashima keeps looking down at his sake and shaking his head in sadness. Then he undertakes a monologue about Operation Desert Storm and how, again, the United States had invaded a sovereign nation. His solution is to give Iraq money. If you give someone enough money, they will become nonaggressive, he argues. This is how today's Japan would respond, he says. Arguing with some people is like sweeping a dirt floor clean. This, I soon realized, was the case with Harashima. I excused myself. Even though I explained to him I did not invade Grenada, a few steps away, I hear him again mutter

"How COULD you!?"

I whimsically contemplate feigning violence. Possibly Harashima would then offer me a generous sum of money to go away.

I recently learned that Harashima started traveling to the United States again. I believe his duties as Dean were the real reason he no longer traveled to the United States. Either that, or he gave further consideration to my lucid points and changed his political thinking.

When sumos fly

2.3.1 The Nagoya IJCNN & the Standards of War

The Nagoya IJCNN conference discussed with Amari over a traditional Japanese breakfast in 1990 became a reality in 1992. It is a great technical success - with over 800 attendees. I participate in a session on standards organized by the NNC. Standards are important. Imagine, for example, if there were no standard for electric wall sockets in the US. Use of electric appliances plugged into the wall would be one large connection headache. A hair dryer with a plug fit for the wall socket in your home may not work with the hotel socket of your hotel room. Fortunately, there is a United States standard for wall sockets and every manufacturer of things you plug in the wall knows how to design the electric plug. Other examples are numerous. The special panel session topic at the IJCNN conference was on the need for standards in the field of neural networks. Participants were Teovo Kohonen from Finland, Rolf Eckmiller from Germany, Yoshida Uchikawa from Japan and me. Yoshida, or Yoshi for short, was a good friend of Toshie Fukuda's. I encouraged them that if they ever failed in academia, they could open a string of teriyaki bars called Toshie and Yoshi's'.



Figure 89: A panel of standards. From left to right: me. Shiro Usui, Teuvo Kohonen and Rolf Eckmiller.

Yoshi started the session out by stating that Japan had lost World War II because of lack of manufacturing standards. There are some uneasy chuckles from the audience. Airplane parts manufactured in one factory did not fit into those manufactured in another. Therefore, he concluded, standards were very important.

Eckmiller the German stood. Rolf is a proper and tall with a quick wit and good posture. “Germany”, he says spontaneously, “lost the war because of too strict of standards”. He goes on to explain that too strict of standards can repress individuality and innovation.

Now it’s my turn. I am nervous. I want to proudly defend and represent America in this technical- turned-political discussion. My mind churns for bold sophisticated and clever words that will guilefully continue this theme.

“Like the story of Goldilocks and the three bears, US standards were neither to loose or too strict. They were just right! That’s why we won the war.”

I don’t say that.

“Japan did not loose World War II because of lack of technical standards. It had more to do with the astonishing fighting power of the Allied forces and the dropping of the atomic bomb”.

I don’t say that either.

“I always get confused when when talking to foreign nationals. Which are you? Did we save your ass or did we kick your ass?”

Nope.

“There are those who question whether the time is right to develop standards for neural networks. They say we should wait. We must ask, though, what more will we know in five or ten years about development of basic standards that we

do not know now?”

This is what I say. A golden opportunity lost for a true patriot. Pure wimp-out.

2.3.2 Mr. Big

Have you read Michael Crichton’s book *Rising Sun*? The book is pretty good - but the movie got a thumbs down from me. It contains a lot of Japan bashing. I’m not a believer in a Japanese conspiracy. I do think, though, there is a lot of national pride in Japan. Sometimes it manifests itself in American bashing. The conference banquet speaker at the Nagoya IJCNN does just that. He is the CEO of a Japanese company that manufactures tools. He claims the Japanese, in business, are like farmers. They look at projects in great detail and spend significant effort in perfection of precision. The Americans, on the other hand, are hunters. Americans are always on the lookout for new inventions and ideas. He illustrates the point with an application of their battery operated drill.

“In Japan”, he says, “we would never have innovatively conceived a use for our battery operated drill as clever as this.”

The lights dim, heavy metal music blares and two big screen televisions on both sides of the banquet hall dimly illuminate the audience. The picture is of a heavy metal American band named Mr. Big. The lead guitarist is operating a battery powered drill. Where the drill bit should have been, a circular array of guitar picks rotates. When the drill operates, the guitar picks pluck the guitar strings. The result is a flurry of fast short notes. It actually sounded pretty good. The audience, mostly Japanese, roars in laughter at this American innovation of Japanese technology. I thought it was a pretty clever idea.

2.3.3 Japan is a Gas

The International Conference on Fuzzy Systems (FUZZ-IEEE) is held in Yokohama in March 1995. Toshio Fukuda is again the guiding force behind the conference. Although this is the third FUZZ-IEEE, it is the first IEEE conference on fuzzy logic ever held in Japan - the country that pioneered fuzzy logic applications. It is also the largest technical fuzzy conference ever held in Japan.

My train ride from Narita airport outside of Tokyo is uneventful except for two things. First, some Japanese whackos gas the subway from Tokyo and Yokohama killing some and injuring a lot. This is the same day I am travelling between Tokyo and Yokohama. My family in the US hears the news and is scared. There are seven notes waiting for me at the hotel asking if I am still alive. I call my wife Connie in the US and replayed the old Mark Twain comment, “Rumors of my death are greatly exaggerated.”

The second problem I encounter with my trip is getting off of the train one stop early. I walk about with all my luggage looking my role as a lost tourist. I am approached by a friendly Japanese man who asks where I was going. I showed him a flyer from the conference and he laughs.

“You got off tlain to soon. No ploblem”²⁴

The friendly Japanese man - I forget his name so let's call him Teriyaki - picks up my suitcase and motions for me to follow. He puts some coins in a train ticket vending machine and purchases passage for the both of us to the next train stop. Teriyaki insists on carrying my suitcase to the train and riding with me to the next stop. On the train, I smell his breath for the first time. He is drunk. Obviously, he is the type of drunk who becomes friendly when he drinks. We arrived at the proper stop and Teriyaki carries my bag to the hotel.

“I buy you dlink” he offers.

I say I'd love a glass of mineral water - so my new friend and I are off to the hotel bar. I learn he is drinking to cover the sting of receiving his oldest son's latest test scores. In Japan, students are given tests at various points in their matriculation. The outcomes determine life long vocations. If they flunk the first test, their career ceiling is, say, window washing. If the second test is failed, their careers are chosen to be at some higher level profession. Teriyaki's son had just flunked one of these tests and could not now go to college. Teriyaki has lost face due to this and is chugging sake to forget. He says Japan is bad. The houses are little, the tests are unfair and the government keeps everybody poor so the country can be financially prosperous. Here is a guy that needs cheering. I tell Teriyaki the old story about the best carnal life in the world. It includes French food, a Japanese wife, British law and an American home. The worst life is French government, a Japanese home, British food and an American wife. (An exception, of course, is my wife. I love you honey!) Teriyaki laughs hard and takes another swig of sake. We talk some more and part with a handshake and a few deep bows.

Although I don't condone Teriyaki's drinking solution to purge problems, it beats the more traditional samurai solution.

2.3.4 **Karaoke**

Karaoke is the best thing Japan ever invented. Americans screwed it up. In America, you go into a bar and sing in front of a bunch of people you don't know. In Japan, its different. You rent a room with a karaoke machine. Only you and your friends go into the room. You can bring in your own drinks and munchies. Your sour notes are heard only by those you know. If you are only acquaintances when you start, you will be back-slapping friends after an evening of karaoke. There is no way two people can sing in front of each other for a couple of hours and not be good buddies. Karaoke, I am told, means “empty orchestra”. It has the same root as karate which means “empty hand”.

²⁴ Japanese and Chinese have difficulty distinguishing between r's and l's. That's why you'll hear Oriental accent parodies with l's replaced by r's, like “That's reary rovery,” and visa versa, like “I'd like some flied lice in my loom.” American's aren't much better though. I've had a Vietnamese student say six different Vietnamese words to me that all sounded like a short “a” and swear she had pronounced them all the same. Most languages apparently have blind sounds in other languages difficult to distinguish. Try saying the following quickly to someone - “In mud eels are. In clay none are.” They will have no idea what you are saying.

At the Nagoya IJCNN conference, Toshio Fukuda invites all the organizing committee for the conference to a karaoke room. Its a who's who in neural networks, including David Rumelhart, Sun-Ichi Amari, Robert Hecht-Nielsen, Shiru Usui, Fukushima and Teuvo Kohonen. Hecht-Nielsen, president and founder of RHN (Robert Hecht- Nielson) Inc., the most visible of the neural network companies, begins with a monotone version of the Beach Boy's "Surfin' USA". Everyone howls. Robert does a mock bow. Every person in the room takes their turn except for one guy from the World Bank who was into neural networks and finance. He was right to do this. It would have totally blown his stuffed shirt image. Me? I did the Token's "The Lion Sleeps Tonight" complete with falsetto. For my highly demanded encore, I belted a rousing "House of the Rising Sun".

My most memorable karaoke experience was at the Yokohama FUZZ-IEEE. Toshio took seven people to a karaoke room. There was Toshio, Shibata (one of Toshio's students), two guys from Russia, a German, a Norwegian and me. In thick accents, the Russians did a spirited duet of the Beatle's "Back in the USSR". When they got to the line "those Moscow girls really knock me out," they rolled their eyes in mock passion. I split a gut laughing. We ended the evening exploring Yokohama like life long friends.

Do you want harmonious diversity? An end to nationalism and racism? Karaoke may be the answer.

2.3.5 Sianara

As a boy, I knew only that America beat Japan in the second World War. The atomic bomb that ended the war probably saved the life of my Uncle Junior McHenry who would have been in the Allied invading forces. Harashima is right. The Japanese are fierce warriors. When I ask Toshio Fukuda about the war, he offers an animated shrug, an extended lower lip and the explanation "It wasn't my fault. I wasn't there!"

I like today's Japan. The people are directed, homogeneous and disciplined. I have a Japanese television, a Japanese video recorder, a fondness for Japanese food and a cat named Tokyo. I also have a number of good Japanese friends.

Also, all of the bowing these last few years has made my abs tighter.
Shabu-shabu.

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