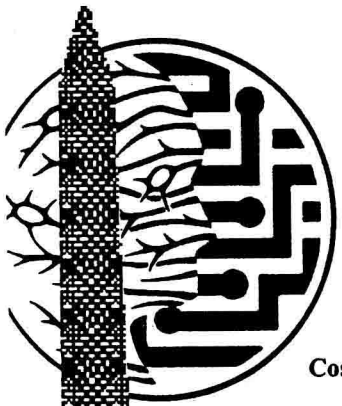
1999 International Joint Conference on Neural Networks (V. 4)



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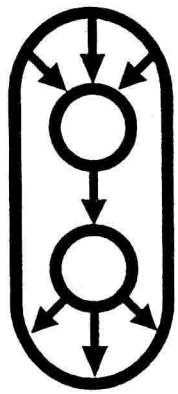

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The Neural Networks Council of IEEE

International Joint Conference on Neural Networks

WASHINGTON, DC
JULY 10-16, 1999

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PROCEEDINGS

Volume 4 of 6
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The 1999 International Joint Conference on Neural Networks Proceedings

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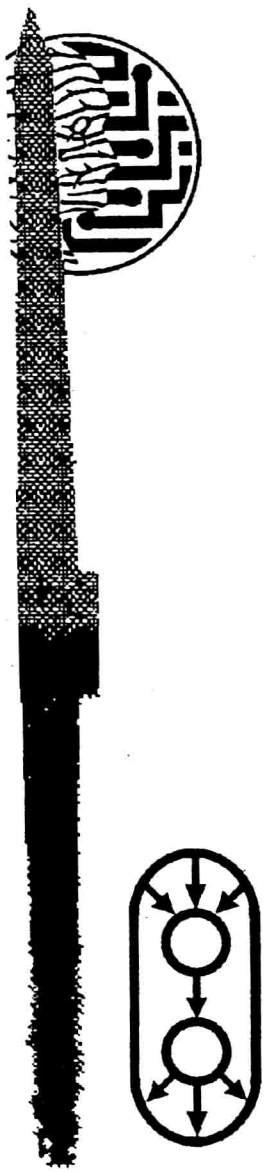
Welcome to IJCNN'99



gton Monument and
dome as seen from the
Memorial Reflecting Pool

On behalf of the Organizing Committee I would like to welcome all of our attendees to the 1999 International Joint Conference on Neural Networks (IJCNN'99). I believe that you will agree with me that the Conference is fortunate to have very high quality technical and tutorial programs and distinguished plenary speakers. We appreciate your participation and look forward to a very rewarding week

Special appreciation is due to Elsevier Scientific for sponsoring the welcome reception and to Ward Systems Group for sponsoring the Financial Series Forecasting Competition.

These Proceedings are provided to enhance the benefit of the Conference to you. They complement the Book of Summaries distributed at the Conference. Every effort has been made to ensure inclusion of all papers appropriately submitted by registered authors and the accuracy of the various indexes and accompanying materials; however, we apologize for any errors which may have inadvertently been made in this regard. Special thanks to Dr. Mary Pastel Anderson, Vice General Chair, and Dr. Jonathan Boswell, Publications Chair, for doing the lion's share of the work in producing these Proceedings.

I would like to express our heartfelt thanks to the members of the Program Committee who carried out the review of summaries submitted for the Conference and who are listed on the next page. In addition I deeply appreciate the efforts of INNS staff and of Ms. Jackie Haynes, Mrs. Arlene Underdonk, Ms. Norma Knapp, and Mr. Phil Quinn for all of their assistance.

David G. Brown, Ph.D.
General Chair, IJCNN'99

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Asian Pacific Neural Network Assembly (APNNA)
International Conference on Neural Information Processing (ICONIP'99)
The Cognitive Science Society
European Neural Network Society (ENNS)
International Conference on Artificial Networks (ICANN'98)
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Message from the INNS President

Dear Colleagues,

It is my great pleasure as President of the International Neural Network Society (INNS) to welcome you to The International Joint Conference on Neural Networks (IJCNN'99), here in Washington, D.C. This premier conference on neural networks is jointly sponsored by INNS and the IEEE Neural Networks Council (IEEE/NNC), with INNS serving as conference management this year. I am sure that you will enjoy the excellent program that has been carefully developed by General Chair, David Brown, and Technical Program Co-Chairs, Daniel Alkon and Clifford Lau.

IJCNN'99 spans the neural network field from neurons to consciousness, from training algorithms to robotics, from chaos to control, from fuzzy logic to evolutionary computing. Leading off with a theme symposium on biological neural networks, the Conference will explore the potential impact of recent discoveries in neurobiology on the computational intelligence community.

The program of IJCNN'99 covers many important directions of research in neural networks. The various plenary talks, special sessions and tutorial short course program have been carefully chosen to further supplement the various core sessions.

We have greatly enjoyed working with Cliff Lau and the IEEE/NNC in putting IJCNN'99 together. I hope that you find the meeting both stimulating and inspiring and that you will apperciate the mission of our Society to serve the neural network community. Let me close this message by welcoming you again.

Sincerely,

David Casasent
Carnegie Mellon University
President, International Neural Network Society

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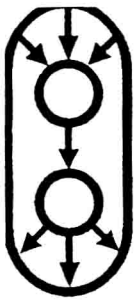

Message From The IEEE/NNC President

Dear Colleagues:

On behalf of the IEEE and the Neural Networks Council (NNC), I would like to add my welcome to y in attending the 1999 International Joint Conference on Neural Networks (IJCNN'99). This year IJC brings us back to the Washington DC area, where there is no shortage of tourist attractions, firework and politics.

In IJCNN'99, we have put together a comprehensive program that covers the entire spectrum of activ in neural networks and applications, from biological neural models to mathematical foundations to pattern recognition. There is something for everyone. The tutorial program is extensive and outstanding. In conjunction with the conference, there is an exciting theme symposium on biological approaches and a NSF workshop on neural networks research in the Former Soviet Union. In additic there is the CEC'99 the week before the conference in DC. You are invited to participate in all these tutorials, workshops, symposiums, and conferences.

In addition to the technical activities, the NNC is also proud to sponsor a large number of students to travel to DC and to attend IJCNN. The student reception will bring together the future generation of neural networks researchers to interact with the current generation. There is also a special technical session by high school students, who will be the future leaders.

I hope this joint sponsorship of IJCNN'99 will benefit the neural networks community, and I hope yo will enjoy this conference as much as I did in sponsoring it and organizing it.

Sincerely,

Clifford Lau
IEEE/NNC President

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Tutorials Presented at IJCNN'99

Saturday Short Courses

Introduction to Neural Networks
George Lendaris
When Your Coffee Pot Plays Chess: Fundamentals of Machine Intelligence
David Brown

Sunday Tutorials

Track 1 Hybrid Systems & Soft Computing
A An Introduction to Evolutionary Computation
David Fogel
B Fuzzy Industrial Applications
Mo Jamshidi
C Soft Computing & Knowledge Management
Larry Medsker & Thomas Beckman

Track 2 Biomedical Diagnosis
A ROC Analysis & Finite-sample Dependence of Performance of Classical& Neural- Network Classifiers
Robert Wagner
B Brain Imaging
John Taylor

Track 3 Brains & Biological Neural Networks
A Neuromodulation & Cortical Function
Michael Hasselmo
C Ionic Current Model of the Outer Retinal Cells
Shiro Usui
D Massively Parallel Distributed Processing in the Brain: New Developments
Karl Pribram
E From Single Neurons to Brain Chaos
Walter Freeman & Stephen Bressler

Track 4 Cognition, Pattern Recognition
A Pattern Recognition & Neural Networks
David Casasent
B Adaptive Resonance Theory
Gail Carpenter

Track 5 Robot Control & Neurocontrol
A Neural Networks & Q-Learning for Robotics
Claude Touzet
B Neurocontrol
Paul Werbos

Track 6 Learning Algorithms & Architectures

A Back-Propagation Learning Guided by Control Techinque
Antonio de Padua Braga

B Practical Aspects of Vapnik-Chervonenkis (VC) Theory
Vladimir Cherkassky

C Stochastic Optimization Via The Simultaneous Perturbation Algorithm
James Spall

D Cortronic Neural Networks
Robert Hecht-Nielsen

E Autonomous Learning: The New Connectionist Algorithms
Asim Roy

Track 7 Unsupervised Learning, Independent Component Analyses & Blind Source Separation

B Independent Component Analysis
Erkki Oja

C Unsupervised Sensory Learning
Harold Szu

Track 8 Speech & Language Processing

C Connectionist & Hybrid HMM/Connectionist Systems for Speech Recognition
Edmondo Trentin & Marco Gori

Track 9 Financial Analyses

A Designing Neural Networks for Credit Analysis
Andre de Carvalho

Track 10 Biosensors & Biocomputing

C Analysis of DNA Sequences with Artificial Neural Networks
A. G. Hatzigeorgiou, M. Reczko, V.B. Bajic & I.V. Bajic

E Overview of pulse coupled neural networks (PCNNs)
Mary Lou Padgett

Track 11 Engineering Diagnosis/Application

B Neural Networks for Nondestructive Evaluation Applications
L.W. Schmerr, L. Udpa, S. S. Udpa & F.C. Morabito

D Neural Learning in Structured Domains
M. Gori, M. Maggini

Track 12 Implementation

B Implementation of Fuzzy Logic Control Systems
Takeshi Yamakawa

Financial Series Forecasting Competition

IJCNN'99 offered a financial series forecasting competition, which took place over the period of June 23, 1999, to July 7, 1999 inclusive. The objective of the competition was to forecast consistently the daily value of a financial series over the period using neurally inspired models. Twenty-three researchers participated in the competition, and the top competitors achieved outstanding results. In first place is Klaus Breslauer, Vancouver, British Columbia. He was closely followed by Min Qi, Kent State Univeristy, and Parinya Disorntetiwat, University of Missouri, Rolla. Further details are given in the appended description of the Competition.

We are greatly indebted to Dr. Masud Cader, International Finance Corporation, for conceiving of and managing the Competition. Data was provided by the Emerging Market Database group of the IFC. Server space and web programming were provided by Melange Graphics, and prizes were provided by Ward Systems for the top two finishers.

IJCNN'99 Keynote and Plenary Presentations

Sunday 7/11	Keynote Address Computational Neurobiology/Biophysics John Hopfield
Sunday 7/11	Plenary Speech Functional Approximation and Rule Extraction with Fuzzy Clustering Jim Bezdek
Monday 7/12	Joint Theme Symposium and Conference Plenary Speech The Valuated State Space Approach and Evolutionary Computation for Problem Solving Lawrence Fogel
Monday 7/12	Keynote Discussion Session John Hopfield
Wednesday 7/14	Plenary Speech Three Bedrooms, Two Baths, and Four Hidden Layers: The Neural Network House Michael Mozer
Wednesday 7/14	Awards Banquet Plenary The HAL9000 Computer and the Vision of 2001: A Space Odyssey David Stork
Thursday 7/15	Plenary Speech Independent Components of Functional Brain Imaging Terrence Sejnowski
Thursday 7/15	Plenary Discussion Session Terrence Sejnowski
Thursday 7/15	Plenary Discussion Session Michael Buro
Friday 7/16	Plenary Speech How Machines Have Learned to Play Othello Michael Buro

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