2001 International Joint Conference
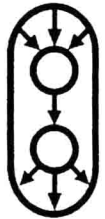on Neural Networks
Vol. 4 of 4

IJCNN'01

IEEE

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The Neural Networks Council of IEEE

International Joint Conference
on
Neural Networks

Washington, DC
July 15-19, 2001

PROCEEDINGS

Volume 4 of 4

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The 2001 International Joint Conference on Neural Networks Proceedings

Welcome to IJCNN '01

On behalf of the members of the Organizing Committees, we would like to welcome everyone to the first International Joint Conference on Neural Networks of the new Millennium. The conference this year is sponsored by the International Neural Network Society, in conjunction with the IEEE, and returns to the site of the IJCNN two years ago. Our venue, Washington, D.C., offers an abundance of interesting sites and activities for our attendees and their accompanying friends and family, although without the spectacular mountain scenery provided for us in Como, Italy last year. In addition, we have reworked the format of the conference to reduce the number of parallel sessions in an effort to allow attendees to investigate presentations and discussions outside of their normal disciplines. In order to provide this new format, we have featured the Poster Sessions in a stand-alone presentation schedule, combined with the refreshments, and with no competing oral presentations. We hope that this structure will serve to encourage broader and inter-disciplinary discussions at those sessions.

Our featured speakers this year include Prof. Teuvo Kohonen and Prof. Bernard Widrow, along with Dr. Paul Stewart. A major announcement concerning new NSF funding initiatives will be made in one of the special presentations. In addition, we have introduced two new topics into special sessions at this conference. One on Quantum Computing will explore that topic and applications to quantum neural computing, the other will be a competition based upon analysis, estimation and prediction of time series for challenging problems.

At this time, we would like to take the opportunity to acknowledge the dedicated efforts of a small team of people who have worked to organize and schedule the 2001 conference. When we undertook the task of serving as General Chairs, we recognized that the work could not be accomplished without key support from INNS members and the entire Program Committee including teams from Talley, Community of Science and Omnipress. We are especially indebted to Dr. Danil Prokhorov who worked long hours on the massive task of managing collection and reviews of papers and scheduling the presentations at the conference. Dr. Prokhorov also single-handedly worked to organize the Special Sessions, in effect handling the duties of Technical Chair and Program Chair. Prof. George Lendaris, as well as key members of the INNS Board of Governors, devoted considerable time and effort to helping us get the conference organized along the lines of past INNS/IEEE collaborations. Our friend and colleague, Dr. Lee Feldkamp, in a freelance role, suggested many strategies we implemented in putting together the conference program. Dr. Anya Tascillo served very well as the Publicity Chair and helped organize the Conference Website. She also initiated and carried out the T-shirt project. Prof. Carlo Morabito organized the tutorials on Sunday, while Prof. Larry Medsker took care of the local arrangements. Dr. Harold Szu, took the initiative in organizing the nominations and voting for this years Award Recipients. Many thanks to all of them!

We look forward to an exciting and productive conference.

<div style="text-align:center">

Ken Marko   Paul Werbos

General Co-Chairmen

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v

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Letter from the INNS President

On behalf of the International Neural Network Society, the IEEE Neural Network Council, and all the other sponsoring organizations -- which comprise virtually all of the major Neural Network professional organizations -- I wish to welcome you to the 2001 International Joint Conference on Neural Networks (IJCNN'01).

A great challenge lies ahead for those of us interested in the continued development and evolution of the (artificial) neural network computational paradigm -- or more generally, Computational Intelligence. While many of us in attendance at the IJCNN are engineers, computer scientists, physicists, mathematicians, statisticians, etc., we must maintain awareness that the key inspiration, insights and motivators for Computational Intelligence -- be it neural networks, fuzzy logic, genetic algorithms, etc. -- come from the study of biological systems and from the study of cognitive acts of animals and humans. Let us recall, while it is true that we learned how to fly only after we stopped imitating how birds fly, we learned to ask the important application-oriented questions of nature about how birds fly only after the first successful man-made aircraft were flown. It is important that a viable community of researchers and developers continue to function in a creative, interactive way to provide an environment for the possibility of learning more and more about and from the infinitely complex functioning of biological brain, and to translate this to applications of benefit to humankind.

It is troublesome to observe a decreasing attendance at conferences such as the IJCNN, and decreased subscriptions to the major NN and related journals. Paradoxically, however, this may be attributed to the SUCCESS of the NN computational paradigm in applications. Indeed, 10-15 years ago, the focus of funding from the commercial world contributed to enhancing the theoretical and engineering basis of the NN computational paradigm and figuring out what it was good for. In such a milieu, those interested in this emerging technology were looking for information in any venue they could: e.g., the big NN conferences and the major NN journals. In recent years, however, due to a plateau related to introduction of new theoretical foundation material, the focus of that community has turned to using the existing foundation for solving real engineering problems, and with great success!

There is evidence that neural network and other computational intelligence methods are being embedded into commercial applications in large numbers, with significantly reduced "fanfare" about it -- just as the embedding of conventional (Von Neuman) computer technology is no longer touted in any specific way. Reporting of such successful applications may now occur at conferences and in professional journals that focus on the application area -- be it financial systems, control systems, data mining, pattern recognition, signal processing, etc., etc. The resulting proliferation of venues for meeting, sharing, and discussing application-specific aspects of the NN technology appears to have had the above mentioned impact on attendance at the IJCNNs and the subscriptions to the major NN journals.

HOWEVER, we of the Neural Network community (and more generally, the Computational Intelligence community at large) must beware! It is important that a viable community of researchers be maintained who focus on continued study of the biological exemplar.

Application of the Computational Intelligence technologies to more and more complex and interesting problems stands to benefit substantially from fuller and fuller understanding of the natural biological neural networks. Research on the biological and cognitive aspects must continue, else the basis upon which the applications are to be developed will dry up. It is up to each of us to persuade our respective managements to continue funding an expansion of the underlying knowledge, and to enhance collaboration with the biological and cognitive oriented researchers.

While we are here at this conference, let us dialog about these issues, and expand the general awareness of the importance of encouraging an expanding collaboration between those interested in engineering and mathematical theory and ultimate applications, and those who will obtain applicable fundamental knowledge from the existing biological implementation of Intelligence.

Enjoy the conference,
George G. Lendaris, President, INNS

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Welcome from the IEEE/NNC President

On behalf of the IEEE Neural Networks Council, it is my pleasure to welcome all participants to the 2001 International Joint Conference on Neural Networks to its beautiful and historical venue, Washington, D.C.

Once again, the Neural Networks Council is happy to cosponsor this important event with the International Neural Networks Society. We earnestly hope that you will benefit from IJCNN 2001 and that you will enjoy the many sights and attractions of the capital of the United States of America.

I would also like to acknowledge the cooperation of a vast array of international societies and institutions, including the European Neural Networks Society, the Japanese Neural Networks Society, the International Society for Optical Engineering, the American Association for Artificial Intelligence, the Russian Neural Networks Society, the Cognitive Science Society, and the Asia Pacific Neural Networks Assembly.

I want to congratulate the General Co-Chairs of IJCNN 2001, Ken Marko and Paul Werbos, for their efforts in putting together an event encompassing numerous tutorials, special sessions, plenary lectures, and technical competitions. Special thanks go to Danil Prokhorov, Technical Program Chair, Catherine Myers, and Mo-Yuen Chow, Technical Program Vice Chairs for having put together a comprehensive program spanning the many facets of the state of the art in neural-networks concepts and methods.

The strong, continued growth of our Council in recent years has made possible the implementation of several initiatives intended to benefit the technical communities within its scope of interest. Particularly noteworthy among these initiatives are student support programs, including Summer Research Grants, and financial help to attend major conferences such as IJCNN 2001. We look forward to continue and expand the scope of our technical and support activities to the scientific and engineering community.

We also look forward to the continuation of this series of conferences in coming years. The next edition of IJCNN, which will be part of the 2002 World Congress on Computational Intelligence (WCCI 2002), will encompass IJCNN 2002 , the 2002 IEEE International Conference on Fuzzy Systems (FUZZ-IEEE 2002), and the 2002 Congress on Evolutionary Computation (CEC 2002). This will be the third time that these conferences are held together, following successful World Congresses in Orlando, Florida, in 1994, and Anchorage, Alaska, in 1998. The General Chair of WCCI 2002, Dr. David B. Fogel, together with the Vice-General Chair, Professor Mohamed A. El-Sharkawi, and the General Chairs of its component Conferences: Professor C. Lee Giles (IJCNN 2002), Professor Toshio Fukuda (FUZZ-IEEE 2002), and Professor Xin Yao (CEC 2002) join me in inviting you to participate in this encompassing event.

In closing, I would like to thank all INNS and IEEE volunteers that have contributed to the success of IJCNN 2001, and all participants whose support makes possible the continued activities of our Societies.

Enrique H. Ruspini
President

Volume 1
Monday, July 16, 2001

Learning Algorithms, Session 1: Supervised Learning
Chair: Lee Feldkamp

Artificial Systems in Hardware, Session 1

Special Session 1: Environmental Data Processing and
Interpretation by Means of Artificial Neural Networks
Organizers: Roberto Tagliaferri, Salerno University, Italy,
Francesco Carlo Morabito, Reggio Calabria University, Italy

Biological Foundations, Session 2: Cortical Networks
Chairs: John Taylor and Michael Denham

Mathematical Foundations, Session 2: Optimization and Complexity Analisys
Chair: Johan Suykens

Learning Algorithms, Session 2: Unsupervised Learning
Chair: Jagath Rajapakse

Intelligent Control, Session 1: Neurocontrol and System Identification
Chair: Paul Werbos

Special Session 2: Neural Network Projects and Precollege Students
Organizer: Jesse L. Bemley, Joint Educational Facilities, Inc.

Pattern Recognition, Session 1: Automatic Target Recognition and Tracking
Chair: David Casasent

Mathematical Foundations, Session 3: Neurodynamics, Stability and Nonlinear Analysis
Chair: Robert Kozma