Preface

WSTST05 Chairs Welcome Message

The stage for the Fourth IEEE International Workshop on Soft Computing as Transdisciplinary Science and Technology (WSTST05) has been set. On behalf of the WSTST05 program committee, we wish to extend a very warm welcome to the conference and Muroran in May 2005. The conference program committee has organized an exciting and invigorating program comprising presentations from distinguished experts in the field, and important and wide-ranging contributions on state-of-the-art research that provide new insights into current cutting edge results on Soft Computing as Transdisciplinary Science and Technology. WSTST05 is built on the success of the previous three events held in Muroran, Japan namely the IEEE International Workshop on Neuro Fuzzy Control, in 1993; IEEE International Workshop on Soft Computing in Industry, in 1996 and the IEEE International Workshop on Soft Computing in Industry, in 1999.

Soft Computing (SC) has an evolving collection of methodologies, which is aimed to exploit tolerance for imprecision uncertainty, and partial truth to achieve robustness, tractability, and low cost. SC provides attractive opportunity to represent the ambiguity in human thinking with real life uncertainty. Fuzzy logic (FL), Neural Networks (NN), and Evolutionary Computation (EC) were the core methodologies of soft computing. Later chaos computing, fractal theory, wavelet transformation, cellular automaton, percolation models, and immune network theory were added to enhance soft computing. However, they should not be viewed as competing with each other, but synergistic and complementary, instead. SC was actually the combination or fusion of each methodology which yielded new computational capabilities (hybrid systems). Soft computing is currently causing a paradigm shift (breakthrough) in science and technology.

The main themes addressed by this conference are:

- Intelligent hybrid systems
- Fusion of soft computing and hard computing
- Data mining and decision support systems
- Intelligent agent-based systems (complex systems), cognitive and reactive distributed AI systems
- Internet modeling
- Human interface
- Chance discovery
- Applications in image and speech signal processing, prediction, and control, robotics, biology and medicine, business and management, artificial societies, chemicals, pharmaceuticals and materials and environment engineering

WSTST05 is hosted by Muroran Institute of Technology, Japan and is technically co-sponsored by IEEE Systems Man and Cybernetics Society, World Fed-eration on Soft Computing, European Society for Fuzzy Logic and Technology, Japan Society for Promotion of Science, Society of Instrumentation and Control Engineers (SICE, Japan), Transdisciplinary Federation of Science and Technology (Japan), JSPS International meeting series (Japan), and Life-Oriented Software Laboratory (Satellite Venture Business Laboratory), Muroran Institute of Tech-nology (Japan).

The technical program of WSTST05 comprises of nearly 140 papers including 10 invited special sessions. The conference program committee had a very challenging task of choosing high quality submissions. Each paper was peer re-viewed by at least three or more independent referees of the program committee and the papers were selected based on the referee recommendations. The papers offers stimulating insights into emerging intelligent technologies and their applications in Internet security, chance discovery, humanized computational intelligence, web intelligence, data mining, image processing, swarm intelligence, optimization and so on. WSTST05 is blessed to have the presence of Professor Lotfi Zadeh (Father of fuzzy logic and soft computing) as the main plenary speaker of WSTST05. Besides, the following speakers will also deliver keynote addresses during WSTST05.

- Takeshi Furuhashi, Nagoya University, Japan
- Azuma Ohuchi, Hokkaido University, Japan
- Yukio Ohsawa, University of Tsukuba, Japan
- Antony Satyadas, IBM Corporation, USA
- Hideyuki Takagi, Kyushu University, Japan
- Toru Yamaguchi, Tokyo Metropolitan Institute of Technology, Japan
- Krzysztof Cios, University of Colorado, USA
- Zhiliang Wang, University of Science and Technology, China
- Kensuke Kawai, Toshiba Co., Japan

We would like to express our sincere thanks to all the authors and members of the program committee that has made this conference a success. Finally, we hope that you will find these proceedings to be a valuable resource in your professional, re-search, and educational activities whether you are a student, academic, researcher, or a practicing professional.

General Co-Chairs
Yasuhiko Dote, Muroran Institute of Technology, Japan
Seppo J. Ovaska, Helsinki University of Technology, Finland
Ajith Abraham, Chung-Ang University, Republic of Korea

Program Co-Chairs
Azuma Ohuchi, Hokkaido University, Japan
Akimoto Kamiya, Kushiro National College of Technology, Japan
Nobuyoshi Yabuki, Muroran Institute of Technology, Japan

Muroran, February 2005
http://wstst05.softcomputing.net

WSTST05 Organization

Honorary Chair

Lotfi A. Zadeh, University of California, USA

International Advisory Board

James Keller, University of Missouri-Columbia, U.S.A.
Cihan H. Dagli, University of Missouri-Rolla, U.S.A.
Hidenori Kimura, University of Tokyo, Japan
Fumio Harashima, Tokyo Denki University, Japan
Lakhmi Jain, University of South Australia, Australia
Janusz Kacprzyk, Polish Academy of Science, Poland
Antony Satyadas, IBM Corporation, U.S.A.

General Co-Chairs

Yasuhiko Dote, Muroran Institute of Technology, Japan
Seppo J. Ovaska, Helsinki University of Technology, Finland
Ajith Abraham, Chung-Ang University, Republic of Korea

Program Co-Chairs

Azuma Ohuchi, Hokkaido University, Japan
Akimoto Kamiya, Kushiro National College of Technology, Japan
Nobuyoshi Yabuki, Muroran Institute of Technology, Japan

Local Arrangement Co-Chairs

Tadashi Momono, Muroran Institute of Technology

Finance Co-Chairs

Noriaki Kaneki, Muroran Institute of Technology

Publications Co-Chairs

Mario Köppen, Fraunhofer IPK, Germany
Isao Tokuda, Muroran Institute of Technology, Japan
Xiao-Zhi Gao, Helsinki University of Technology, Finland

Web Co-Chairs

Andy AuYeung, Oklahoma State University, USA
Wakio Oka, Muroran Institute of Technology, Japan
Noriyuki Ishii, Muroran Institute of Technology, Japan
Shungo Tanemura, Muroran Institute of Technology, Japan
Masahiro Nakazawa, Muroran Institute of Technology, Japan

Stream Chairs

Intelligent Hybrid Systems
Clarence W. de Silva, University of British Columbia, Canada

Fusion of Soft Computing and Hard Computing
Akimoto Kamiya, Kushiro National College of Technology, Japan

Data Mining and Decision Support Systems
Kate Smith, Monash University, Australia

Chance Discovery
Yukio Ohsawa, University of Tsukuba, Japan

Intelligent Agent-Based Systems, Cognitive and Reactive Distributed Artifcial Intelligence (Complex Systems)
Azuma Ohuchi, Hokkaido University, Japan

Internet Modeling
Vana Kalogeraki, University of California, U.S.A.

Human Interface and Kansei Engineering
Hideyuki Takagi, Kyushu University, Japan

Biology and Medicine
Takashi Uozumi, Muroran Insitute of Technology, Japan

Business and Management
Azuma Ohuchi, Hokkaido University, Japan

Artificial Societies
Azuma Ohuchi, Hokkaido University, Japan

Chemicals, Pharmaceuticals, and Materials
March J. Embrechts, Rensselaer Polytechnic, U.S.A.

Environment Engineering
Tohru Tamura, Muroran Institute of Technology, Japan

International Program Committee

Janos Abonyi, University of Veszprem, Hungary
Soumya Banerjee, Institute of Management Studies, India
Anrew Bonarini, Plitecnico di Milano, Italy
Costa Branco P J, Instituto Superior Technico, Portugal

Maria do Carmo Nicoletti, Federal University of São Carlos
Andre C PL Ferreira de Carvalho, University of San Paulo, Brazil
Yuehui Chen, Jinan University, China
Sung Bae Cho, Yonsei University, Korea
Dipankar Dasgupta, University of Memphis, U.S.A.
Raj Dasgupta, University of Nebraska, USA
Kalyanmoy Deb, Indian Institute of Technology, India
Yasuhiko Dote, Muroran Institute of Technology, Japan
Mark J. Embrechts, Rensselaer Polytechnic Institute, U.S.A.
Takeshi Furuhashi, Mie University, Japan
Matjaz Gams, Jozef Stefan Institute, Slovenia
Maria Ganzha, Private Higher Educational Institute , Poland
Xiao-Zhi Gao, Helsinki University of Technology, Finland
Tom Gedeon, Murdoch University, Australia
Joydeep Ghosh, Universty of Texas at Austin, U.S.A.
Crina Grosan, Babes-Bolyai University, Romania
Sajjad Haider, George Mason University, USA
Hideki Hashimoto, University of Tokyo, Japan
Francisco Herrera, University of Granada, Spain
Hiromitu Hikita, Muroran Institute of Technology, Japan
Frank Hoffmann, Royal Institute of Technology, Sweden
Hitoshi Iba, University of Tokyo, Japan
Hisao Ishibuchi, Osaka Prefecture University, Japan
Ken-ichi Itakura, Muroran Institute of Technology, Japan
R.P. Jagadeesh Chandra Bose, India
Akimoto Kamiya, Kushiro National College of Technology, Japan
Joarder Kamruzzaman, Monash University, Australia
Stephen Kercel, Oak Ridge National Lboratory, U.S.A.
Etienne Kerre, Ghent University, Belgium
Mario Köppen, Fraunhofer IPK, Germany
William B. Langdon, University College London, U.K.
Kyungmi Lee, Griffith University, Australia
Zensho Nakao, University of the Ryukyus, Japan
Yukio Ohsawa, University of Tsukuba, Japan
Azuma Ohuchi, Hokkaido University, Japan
Hironori Okii, Muroran Institute of Technology, Japan
Seppo J. Ovaska, Helsinki University of Technology, Finland
Nikhil .R. Pal, Indian Statistical Institute, India
Vasile Palade, Oxford University, U.K.
Marcin Paprzycki, Oklahoma State University, USA
Witold Pedrycz, University of Alberta, Canada
Tuan Pham, Griffith University, Australia
Wenyu Qu, JASIST, Japan
Daniel Rodic, Nam Tech, South Africa
Rajkumar Roy, Cranfield University, U.K.

WSTST05 Technical Sponsors

IEEE Systems, Man, and Cybernetics Society

WORLD FEDERATION ON SOFT COMPUTING

Satellite Venture Business Laboratory, Muroran Institute of Technology, Japan

Society of Instrumentation and Control Engineers (SICE, Japan)
Transdisciplinary Federation of Science and Technology (Japan)
JSPS International meeting series (Japan)

Contents

Part XIX Collaborative Learning Systems