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Preface: Trends in natural and machine intelligence

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Proceedings of the International Neural Network Society Winter Conference (INNS-WC 2012)

Preface: Trends in Natural and Machine Intelligence

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Abstract

Trends in natural and machine intelligence are increasingly reflecting a convergence in these two well-established fields of study. The Third International Neural Network Society Winter Conference (INNS-WC 2012) was held in Bangkok, Thailand, on October 3-5, 2012. INNS-WC2012, with an aim to bring together scientists, practitioners, and students worldwide, to discuss the past, present, and future challenges and trends in the area of natural and machine intelligence. This event has been a bi-annual conference of the International Neural Network Society (INNS) to provide a forum for international researchers to exchange latest ideas and advances on neural networks and related discipline.

Keywords: natural intelligence, machine intelligence, INNS-WC 2012, SoVIP 2012, SoDAC 2012, Autonomous Learning 2012

1. Introduction

The flagship conference of the International Neural Network Society (INNS) is the International Joint Conference on Neural Networks (IJCNN) that is jointly sponsored by INNS and IEEE Computational Intelligence Society. IJCNN traditionally features invited plenary talks by world-renowned speakers in the areas of neural network theory and applications, computational neuroscience, robotics, and distributed intelligence. In addition to regular technical sessions with oral and poster presentations, the conference program will include special sessions, competitions, tutorials and workshops on topics of current interest. Typically there are well over six hundred delegates in this annual event.

The board of governors of INNS decided in 2006 to establish a series of symposia or winter conferences devoted to new developments in neural networks. The first of the INNS Symposia Series was held in Auckland,

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New Zealand back on November 24-25, 2008 – http://www.aut.ac.nz/nnn08/. The theme was "Modeling the brain and the nervous system" and comprised of two symposia: 1) Development and Learning; and 2) Computational Neurogenetic Modelling. The second in the series was the INNS International Education Symposium on Neural Networks (INNS-IESNN) held in Lima, Peru on January 25-27, 2011 – http://eventos.spc.org.pe/inns-iesnn/index.html. This third Symposia Series covered a much broader context of "Natural and Machine Intelligence". The event was collocated with the 11th International Conference on Bioinformatics (InCoB 2012) and the 3rd International Conference on Computational Systems-Biology and Bioinformatics (CSBio 2012). Technical highlights included keynote speeches by Fredric Ham and Irwin King, as well as joint technical events with InCoB 2012 and CSBio 2012.

2. Symposia of INNS-WC 2012

INNS-WC 2012 consisted of contributions from the following tracks in natural and machine intelligence and related areas:

* INNS-WC general track: Trends in Natural and Machine Intelligence
* INNS Symposium on Vision and Image Processing (SoVIP2012)
* INNS Symposium on Data Analytics and Competitions (SoDAC2012)
* INNS Symposium on Autonomous Learning (Autonomous Learning 2012)

This book is the proceedings of The International Neural Network Society Winter Conference (INNS-WC 2012). It comprises of 23 accepted papers from a total of 72 submissions received on the EasyChair conference system. Each submission was reviewed by an average of three program committee members. The authors of the submitted papers covered 23 countries worldwide and there were over 66 authors in the conference proceedings. Extended works of selected papers are invited for publication in special issues of international journals after the conference. All submissions were checked by VeriGuide [1] for originality.

2.1. INNS Symposium on Vision and Image Processing (SoVIP 2012)

Vision, as in the ability to see, particularly in the form of images, has always played an essential role in everyday human activities. In the past, images were, today they are, and in the future they will continue to be important information carriers. Recent advances in digital imaging and computer hardware technology have led to an explosion in the use of computer vision in a variety of scientific and engineering applications. These applications often arise from the interactions between fundamental scientific researches and development of new and high-standard technologies.

This symposium aimed to provide an opportunity for researchers to describe scientific achievements and long-term research challenges, point to new research directions, or provide new insights, or brave perspectives that pave the way to innovation. Subjects of interest are video and image processing, and aspects of related disciplines (such as machine learning, computer graphics, biological vision, mathematics) which illuminate the state of the art in video and image processing.

2.2. INNS Symposium on Data Analytics and Competitions (SoDAC 2012)

Data analytics is fast becoming the norm in various industries and government sectors to provide support for improved decision making. It focuses on the process of inference based on available data and domain knowledge. There is also a push for open data accessibility for the advancement and dissemination of timely scientific content.

SoDAC 2012 provided an opportunity for researchers from various disciplines and fields to share and discuss their achievements and challenges, providing novel insights in the interdisciplinary field of data analytics. Subjects of interest range from business analytics to data visualization to knowledge management and discovery. One formal data mining contest on source identification of traffic-related ultrafine particles (UFC) was featured in this event.

In addition, the crowdsourcing systems biology verification process IMPROVER (Industrial Methodology for Process Verification in Research) [2, 3] was presented at SoDAC 2012. In particular, the results of the Diagnostic Signature Challenge held on www.sbvimprover.com were announced here in conjunction with the 2nd SBV IMPROVER Symposium held on October 2-3, 2012 in Boston, USA.

2.3. INNS Symposium on Autonomous Learning (Autonomous Learning 2012)

Autonomous learning is a very broad term and includes many different kinds of learning. Fundamental to all of them is some kind of a learning algorithm. Whatever the kind of learning, we generally have not been able to deploy the learning systems on a very wide scale, although there certainly are exceptions.

One of the biggest challenges to wider deployment of existing learning systems comes from algorithmic control. Most of the current learning algorithms require parameters to be set individually for almost every problem to be solved. That is, virtually all current approaches to machine learning typically require a human supervisor to design the learning architecture, select the training examples, design the form of the representation of the training examples, choose the learning algorithm, set the learning parameters, decide when to stop learning, and choose the way in which the performance of the learning algorithm is evaluated. This strong dependence on human supervision is greatly retarding the development and ubiquitous deployment autonomous artificial learning systems."

Autonomous Learning 2012 has covered the topics of autonomous learning, focusing mainly on automation of learning methods that can avoid the kind of dependencies described above. This symposium composed of video conferencing of 12 distinguished speakers from the Autonomous Learning SIG [4] of INNS, as a follow up to a *Neural Networks Special Issue: Autonomous Learning* [5].

3. Organization

The following shows the organization structure of INNS-WC 2012, including the organizing chairs of the three INNS Symposia.

3.1. Organizers

King Mongkut's University of Technology Thonburi (KMUTT), Bangkok, Thailand;
National Center for Genetic Engineering and Biotechnology (BIOTEC),
National Science and Technology Development Agency (NSTDA), Thailand.

3.2. Technical Co-sponsors

International Neural Network Society (INNS)
INNS Thailand Region Chapter
Thailand Chapter of ACM
IEEE Student Branch of KMUTT

3.3. Conference Committee

Advisory Committee:

Ron Sun (Rensselaer Polytechnic Institute, USA) - President, INNS
Danil Prokhorov (Toyota Technical Center, USA) - President-Elect and VP-Conferences, INNS
Irwin King (Chinese University of Hong Kong, China) - VP-Membership, INNS
Dave Casasent (Carnegie Mellon University, USA) - Treasurer, INNS
Nikola Kasabov (Auckland University of Technology, New Zealand) - Immediate Past President, INNS

General Co-Chairs:

Jonathan H. Chan, KMUTT, Thailand
Ah-Hwee Tan, Nanyang Technological University, Singapore

Symposium Chairs:

SoDAC 2012 - INNS Symposium on Data Analytics and Competitions

- Donald Wunsch (Missouri University of Science and Technology, USA)
- Hava Siegelmann (University of Massachusetts, USA)

SoVIP 2012 - INNS Symposium on Vision and Image Processing

- Chee Seng Chan (University of Malaya, Malaysia)

Autonomous Learning 2012 - INNS Symposium on Autonomous Learning

- Asim Roy (Arizona State University, USA)

Publication Chair:	Soo-Young Lee, KAIST, Korea
Publicity Co-chairs:	Suash Deb, CV Raman College of Engineering, India Anand Dersingh, ABAC, Thailand Jie Zhang, Nanyang Technological University, Singapore
Local Organizing Chairs:	Olarn Rojanapornpun, Thailand
Competitions Chairs:	Chee Peng Lim, Malaysia Weng Kin Lai, Malaysia
Local Arrangement Chair:	Wannida Soontreerutana, Thailand
Webmaster:	Worrawat Engchuan, Thailand

3.4. Program Committee

Andre L. C. Barczak
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Silyeek Tan
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Saowaluk Watanapa
Pawel Wawrzynski
Chee Onn Wong
Dennis Wong
Donald Wunsch
Wooihen Yap
Pratheepan Yogarajah
Jie Zhang
Xuguang Zhang

3.5. Additional reviewers

Andrea Canessa, Kim Meng Liang, Olarn Rojanapornpun

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