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Preface

This volume contains the papers selected for presentation at *The 2010 International Conference on Brain Informatics* (BI 2010) held at York University, Toronto, Canada, during August 28–30, 2010. It was organized by the Web Intelligence Consortium (WIC), the IEEE Computational Intelligence Society Task Force on Brain Informatics (IEEE-CIS TF-BI), and York University. The conference was held jointly with the 2010 International Conference on Active Media Technology (AMT 2010).

Brain informatics (BI) has emerged as an interdisciplinary research field that focuses on studying the mechanisms underlying the human information processing system (HIPS). It investigates the essential functions of the brain, ranging from perception to thinking, and encompassing such areas as multi-perception, attention, memory, language, computation, heuristic search, reasoning, planning, decision-making, problem-solving, learning, discovery, and creativity. The goal of BI is to develop and demonstrate a systematic approach to achieving an integrated understanding of both macroscopic and microscopic-level working principles of the brain, by means of experimental, computational, and cognitive neuroscience studies, as well as utilizing advanced Web intelligence (WI)-centric information technologies. BI represents a potentially revolutionary shift in the way that research is undertaken. It attempts to capture new forms of collaborative and interdisciplinary work. In this vision, new kinds of BI methods and global research communities will emerge, through infrastructure on the wisdom Web and knowledge grids that enable high-speed and distributed, large-scale analysis and computations, and radically new ways of sharing data/knowledge.

The Brain Informatics Conferences started with the First WICI International Workshop on Web Intelligence meets Brain Informatics (WImBI 2006), held at Beijing, China, December 15–16, 2006. The second conference, Brain Informatics 2009, was held again in Beijing, China, October 22–24, 2009. This series is the first conference specifically dedicated to interdisciplinary research in BI and provides an international forum to bring together researchers and practitioners from diverse fields, such as computer science, information technology, artificial intelligence, Web intelligence, cognitive science, neuroscience, medical science, life science, economics, data mining, data science and knowledge science, intelligent agent technology, human–computer interaction, complex systems, and systems science, to present the state of the art in the development of BI, and to explore the main research problems in BI that lie in the interplay between the studies of the human brain and the research of informatics. All the papers submitted to BI 2010 were rigorously reviewed by three committee members and external reviewers. The selected papers offered new insights into the research challenges and development of BI.

There are bidirectional mutual support tracks of BI research. In one direction, one models and characterizes the functions of the human brain based on the notions of information processing systems. WI-centric information technologies are applied to support brain science studies. For instance, the wisdom Web, knowledge grids, and cloud computing enable high-speed, large-scale analysis, simulation, and computation as well as new ways of sharing research data and scientific discoveries. In another direction, informatics-enabled brain studies, e.g., based on fMRI, EEG, and MEG, significantly broaden the spectrum of theories and models of brain sciences and offer new insights into the development of human-level intelligence toward brain-inspired wisdom Web computing.

BI 2010 had a very exciting program with many features, ranging from keynote talks, regular technical sessions, WIC featured sessions and social programs. All of these would not have been possible without the great support of the authors in submitting and presenting their best and latest research results, the distinguished contributions of keynote speakers, Vinod Goel (York University, Canada), Jianhua Ma (Hosei University, Japan), Ben Shneiderman (University of Maryland, USA) and Yingxu Wang (University of Calgary, Canada), in preparing and delivering their very stimulating talks, and the generous dedication of the Program Committee members and the external reviewers in reviewing the submitted papers. We wish to express our gratitude to all authors, the keynote speakers, and the members of the Conference Committees for their instrumental and unfailing support.

BI 2010 could not have taken place without the great team effort of the Local Organizing Committee, the support of the International WIC Institute, Beijing University of Technology, China and York University, Canada. Our special thanks go to Aijun An, Juzhen Dong, Jian Yang, and Daniel Tao for organizing and promoting BI 2010 and coordinating with AMT 2010. We are grateful to the Springer *Lecture Notes in Computer Science* (LNCS/LNAI) team for their generous support. We thank Alfred Hofmann and Anna Kramer of Springer for their help in coordinating the publication of this special volume in an emerging and interdisciplinary research field.

August 2010

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