Chapter XXIII


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Cognitive informatics (CI) is a cutting-edge and multidisciplinary research area that tackles the fundamental problems shared by modern informatics, computation, software engineering, AI, cybernetics, cognitive science, neuro-psychology, medical science, systems science, philosophy, linguistics, economics, management science, and life sciences [Wang, 2002]. CI can be viewed as a trans-disciplinary enquiry of cognitive and information sciences that investigates into the internal information processing mechanisms and processes of the brain and natural intelligence, and their engineering applications [Wang, 2003, 2007a; Wang and Kinsner, 2006]. It is a trans-disciplinary study of the internal information processing mechanisms and processes of the natural intelligence – human brains and minds – and their engineering applications.
The IEEE International Conference on Cognitive Informatics (ICCI) series has been established since 2002 [Wang et al., 2002; Patel et al., 2003; Chan et al., 2004; Kinsner et al., 2005; Yao et al., 2006]. The conference provides the main forum for the exchange and cross-fertilization of ideas in CI. ICCI’06 is the fifth conference of the series and was held at the Institute of Automation, Chinese Academy of Sciences, Beijing, China during July 17-19, 2006. ICCI’06 was organized by conference Co-Chairs Yingxu Wang (University of Calgary), Yixin Zhong (Beijing University of Posts and Telecommunications), and Witold Kinsner (University of Manitoba), and Program Co-Chairs Zhongzhi Shi (Chinese Academy of Sciences) and Yiyu Yao (University of Regina), with the valuable support of Organization Co-Chairs Yuyu Yuan (Beijing University of Posts and Telecommunications), Guoyin Wang (Chongqing University of Posts and Telecommunications) and Zeng-Guang Hou (Chinese Academy of Sciences, China). The program committee of ICCI’06 consists of over 50 experts in various areas of CI around the world.

The theme of ICCI’06 is natural intelligence, autonomic computing, and neural informatics. The objectives of ICCI’06 are to draw attention of researchers, practitioners, and graduate students to the investigation of cognitive mechanisms and processes of human information processing, and to stimulate the international effort on cognitive informatics research and engineering applications.

The ICCI’06 program encompasses 40 regular papers and 55 short papers selected from 276 submissions from 18 countries based on rigorous reviews by program committee members and external reviewers. Two-volume proceedings have been published by IEEE CS Press [Yao et al., 2006]. During the conference, presentations were arranged into the following 18 sessions:

1. Cognitive Models
2. Pattern and Emotion Recognition
3. Computational Intelligence
4. CI Foundations of Software Engineering
5. Autonomic Agents
6. Biosignal Processing
7. Cognitive Complexity of Software
8. Knowledge Manipulation
9. Rough Sets and Problem Solving
10. Descriptive Mathematics for CI
11. Visual Information Processing
12. Knowledge Representation
13. Cognitive Data Mining
14. Neural Networks
15. Pattern Classification
16. Machine Learning
17. Intelligent Algorithms
18. Intelligent Decision-Making

The ICCI’06 program covers a wide spectrum of topics that contribute to cognitive informatics and cognitive computers. Researchers exchanged ideas on processes of the natural intelligence (i.e., brain organization, cognitive mechanism and process, memory and learning, thinking and reasoning, cognitive linguistics, and neuropsychology), internal information processing mechanisms (i.e., cognitive informatics model of the brain, the OAR model, knowledge representation and engineering, machine learning, neural networks and neural computation, pattern recognition, and fuzzy logic), and engineering applications of CI (i.e., autonomic computing, informatics foundation of software engineering, software agent systems, quantum information processing, bioinformatics, web-based information systems, and agent technologies). ICCI’06 brought together a group of over 100 researchers and graduate students to exchange latest research results and to explore new ideas in CI. Through stimulating discussion and a panel session on the future of cognitive informatics, the participants were excited about the current advances, the future trends, and expected development in CI.