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IFIP – The International Federation for Information Processing

IFIP was founded in 1960 under the auspices of UNESCO, following the first World Computer Congress held in Paris the previous year. A federation for societies working in information processing, IFIP's aim is two-fold: to support information processing in the countries of its members and to encourage technology transfer to developing nations. As its mission statement clearly states:

> *IFIP is the global non-profit federation of societies of ICT professionals that aims at achieving a worldwide professional and socially responsible development and application of information and communication technologies.*

IFIP is a non-profit-making organization, run almost solely by 2500 volunteers. It operates through a number of technical committees and working groups, which organize events and publications. IFIP's events range from large international open conferences to working conferences and local seminars.

The flagship event is the IFIP World Computer Congress, at which both invited and contributed papers are presented. Contributed papers are rigorously refereed and the rejection rate is high.

As with the Congress, participation in the open conferences is open to all and papers may be invited or submitted. Again, submitted papers are stringently refereed.

The working conferences are structured differently. They are usually run by a working group and attendance is generally smaller and occasionally by invitation only. Their purpose is to create an atmosphere conducive to innovation and development. Refereeing is also rigorous and papers are subjected to extensive group discussion.

Publications arising from IFIP events vary. The papers presented at the IFIP World Computer Congress and at open conferences are published as conference proceedings, while the results of the working conferences are often published as collections of selected and edited papers.

IFIP distinguishes three types of institutional membership: Country Representative Members, Members at Large, and Associate Members. The type of organization that can apply for membership is a wide variety and includes national or international societies of individual computer scientists/ICT professionals, associations or federations of such societies, government institutions/government related organizations, national or international research institutes or consortia, universities, academies of sciences, companies, national or international associations or federations of companies.

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Zhongzhi Shi · Sunil Vadera
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Intelligent Information Processing VIII

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Preface

This volume comprises the 9th IFIP International Conference on Intelligent Information Processing. As the world proceeds quickly into the Information Age, it encounters both successes and challenges, and it is well recognized that intelligent information processing provides the key to the Information Age and to mastering many of these challenges. Intelligent information processing supports the most advanced productive tools that are said to be able to change human life and the world itself. However, the path is never a straight one and every new technology brings with it a spate of new research problems to be tackled by researchers; as a result we are not running out of topics; rather the demand is ever increasing. This conference provides a forum for engineers and scientists in academia, university and industry to present their latest research findings in all aspects of intelligent information processing.

We received more than 40 papers, of which 24 papers are included in this program as regular papers and 3 as short papers. We are grateful for the dedicated work of both the authors and the referees, and we hope these proceedings will continue to bear fruit over the years to come. All papers submitted were reviewed by two referees.

A conference such as this cannot succeed without the help from many individuals who contributed their valuable time and expertise. We want to express our sincere gratitude to the Program Committee members and referees, who invested many hours for reviews and deliberations. They provided detailed and constructive review reports that significantly improved the papers included in the program.

We are very grateful the sponsorship of the following organizations: IFIP TC12, Deakin University, and Institute of Computing Technology, Chinese Academy of Sciences. Thanks to Gang Ma for carefully checking the proceedings.

Finally, we hope you find this volume inspiring and informative.

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Keynote and Invited Presentations
(Abstracts)

Automated Reasoning
and Cognitive Computing

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Abstract. This talk discusses the use of first order automated reasoning in question answering and cognitive computing. The history of automated reasoning systems and the state of the art are sketched. In a first part of the talk the natural language question answering project LogAnswer is briefly depicted and the challenges faced therein are addressed. This includes a treatment of query relaxation, web-services, large knowledge bases and co-operative answering. In a second part a bridge to human reasoning as it is investigated in cognitive psychology is constructed; some examples from human reasoning are discussed together with possible logical models. Finally the topic of benchmark problems in commonsense reasoning is presented together with our appoach.

An Elastic, On-demand, Data Supply Chain for Human Centred Information Dominance

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Abstract. We consider different instances of this broad framework, which can roughly be classified into two cases. In one instance, the system is assumed to be a black box, whose inner working is not known, but whose states can be (partially) observed during a run of the system. In the second instance, one has (partial) knowledge about the inner working of the system, which provides information on which runs of the system are possible. In this talk, we will review some of our recent research that investigates different instances of this general framework of ontology-based monitoring of dynamic systems. Getting the right data from any data sources, in any formats, with different sizes and have different multitudes of complexity, in real time to the right person at the right time and in a form which they can rapidly assimilate and use is the concept of Elastic On-demand Data Supply Chain. Finding out what data is needed from which system, where and why is it needed, how is the data searched, extracted, aggregated represented and how should it be presented visually so that the user can use and operate the information without much training is applying a human centred approach to on-demand data supply chain. Information Dominance represents how by using guided analytics and self-service on the data, human cognitive information capabilities including optimization of systems and resources for decision making in the dynamic and complex environment are built. In this presentation, I explain these concepts and demonstrate how the effectiveness and efficiency of the above integrated approach is validated by providing both theoretical concept proofing with stratification, target sets, reachability, incremental enlargement principle and practical concept proofing through implementation of the Faceplate. The project is funded by Australian Department of Defence.

Why Is My Entity Typical or Special? Approaches for Inlying and Outlying Aspects Mining

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Abstract. When investigating an individual entity, we may wish to identify aspects in which it is usual or unusual compared to other entities. We refer to this as the inlying/outlying aspects mining problem and it is important for comparative analysis and answering questions such as "How is this entity special?" or "How does it coincide or differ from other entities?" Such information could be useful in a disease diagnosis setting (where the individual is a patient) or in an educational setting (where the individual is a student). We examine possible algorithmic approaches to this task and investigate the scalability and effectiveness of these different approaches.

Advanced Reasoning Services
for Description Logic Ontologies

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Abstract. Ontology-like knowledge bases (KBs) have become a promising modeling tool in a wide variety of applications such as intelligent Web search, question understanding, in-context advertising, social media mining, and bio-medicine. Such KBs are distinct from traditional KBs in that they are based on *ontologies* (as schemas) that assist in organization and access of information on the Web and from other sources. However, practical ontology-like KBs are usually associated with data of large volume, dynamic with content, and updated rapidly. Efficient systems have been developed for standard reasoning and query answering for OWL/Description Logic (DL) ontologies. In recent years, the issue of facilitating advanced reasoning services is receiving extensive attention in the research community. In this talk, we will discuss recent research results and challenges of three important reasoning tasks of ontologies including ontology change, query explanation and rule-based reasoning for OWL/DL ontologies.

Brain-Like Computing

Zhongzhi Shi

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Abstract. Human-level artificial intelligence, which makes machines with
intelligent behavior of the human brain, is the most challenging major scientific
issues of this century, but also is the current hot topics in academic and industry
area. Brain-like computing has become the leading edge technology in twenty-
first Century, many countries have started the brain science and cognitive
computing projects. Intelligence science has brought a number of inspiration to
the machine intelligence, and promote the research on brain science, cognitive
science, intelligent computing technology and intelligent robot. In this talk,
I will focus on the research progress and development trend of cognitive models,
brain-machine collaboration, and brain-like intelligence.

Brain-like intelligence is a new trend of artificial intelligence that aims at
human-level artificial intelligence through modeling the cognitive brain and
obtaining inspiration from it to power new generation intelligent systems. In
recent years, the upsurges of brain science and intelligent technology research
have been developed in worldwide.

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