Lecture Notes in Computer Science 4484

Commenced Publication in 1973
Founding and Former Series Editors:
Gerhard Goos, Juris Hartmanis, and Jan van Leeuwen

Jin-Yi Cai   S. Barry Cooper
Hong Zhu (Eds.)

Theory and Applications of Models of Computation

4th International Conference, TAMC 2007
Shanghai, China, May 22-25, 2007
Proceedings

Springer

Volume Editors

Jin-Yi Cai
University of Wisconsin, Madison, Computer Sciences Department
1210 West Dayton Street, Madison, WI 53706, USA
E-mail: jyc@cs.wisc.edu

S. Barry Cooper
University of Leeds, School of Mathematics
Leeds LS2 9JT, UK
E-mail: s.b.cooper@leeds.ac.uk

Hong Zhu
Fudan University, Department of Computer Science and Engineering
220 Handan Road, Shanghai, 200433, China
E-mail: hzhu@fudan.edu.cn

Preface

Theory and Applications of Models of Computation (TAMC) is an international conference series with an interdisciplinary character, bringing together researchers working in computer science, mathematics (especially logic) and the physical sciences. This cross-disciplinary character, together with its focus on algorithms, complexity and computability theory, gives the conference a special flavor and distinction.

TAMC 2007 was the fourth conference in the series. The previous three meetings were held May 17 – 19, 2004 in Beijing, May 17 – 20, 2005 in Kunming, and May 15 – 20, 2006 in Beijing, P. R. China. TAMC 2007 was held in Shanghai, May 22 – 25, 2007. Future annual meetings are planned.

At TAMC 2007 we were very pleased to have two plenary speakers, Miklós Ajtai and Fan Chung Graham, each gave a one hour invited talk. Miklós Ajtai spoke on "Generalizations of the Compactness Theorem and Godel's Completeness Theorem for Nonstandard Finite Structures," and Fan Chung Graham spoke on "Detecting Sharp Drops in PageRank and a Simplified Local Partitioning Algorithm." Their respective papers accompanying the talks are included in these proceedings.

In addition, there were two special sessions organized by Barry Cooper and Andrew Lewis on "Computability and Randomness" and by Manindra Agrawal and Angsheng Li on "Algorithms and Complexity." The invited speakers included George Barmpalias, Cristian Calude, Bjorn Kjos-Hanssen, Andre Nies, and Jan Reimann in the "Computability and Randomness" special session, and Manindra Agrawal, Alberto Apostolico, Jin-Yi Cai, Andreas Dress, Naveen Garg and Jaikumar Radhakrishnan in the "Algorithms and Complexity" special session.

The TAMC conference series arose naturally in response to important scientific developments affecting how we compute in the twenty-first century. At the same time, TAMC is already playing an important regional and international role, and promises to become a key contributor to the scientific resurgence seen throughout China and other parts of Asia.

The enthusiasm with which TAMC 2007 was received by the scientific community is evident in the large number of quality articles submitted to the conference. There were over 500 submissions, originating from all over the world. This presented the Program Committee with a major assessment task. The Program Committee finally selected 67 papers for presentation at the conference and inclusion in this LNCS volume. This results in an acceptance rate of just over 13%, making TAMC an extremely selective conference, compared to other leading international conferences.

We are very grateful to the Program Committee, and the many outside referees they called on, for the hard work and expertise which they brought to

the difficult selection process. We also wish to thank all those authors who submitted their work for our consideration. The Program Committee could have accepted many more submissions without compromising standards, and were only restrained by the practicalities of scheduling so many talks, and by the inevitable limitations on the size of this proceedings volume.

Finally, we would like to thank the members of the Editorial Board of *Lecture Notes in Computer Science* and the Editors at Springer for their encouragement and cooperation throughout the preparation of this conference.

Of course TAMC 2007 would not have been possible without the support of our sponsors, and we therefore gratefully acknowledge their help in the realization of this conference.

May 2007   Jin-Yi Cai
                                                                    S. Barry Cooper
                                                                        Hong Zhu

Organization

The conference was organized by: the Software School of Fudan University; University of Leeds, UK; and the University of Wisconsin–Madison, USA.

Conference Chair

Jin-Yi Cai (University of Wisconsin)

Program Committee Co-chairs

S. Barry Cooper (University of Leeds)
Hong Zhu (Fudan University)

Program Committee

Giorgio Ausiello (University of Rome)
Eric Bach (University of Wisconsin)
Nicolò Cesa-Bianchi (University of Milan)
Jianer Chen (Texas A&M University)
Yijia Chen (Shanghai Jiaotong University)
Francis Chin (University of Hong Kong)
C.T. Chong (National University of Singapore)
Kyung-Yong Chwa (KAIST, Korea)
Decheng Ding (Nanjing University)
Rodney Downey (University of Wellington)
Martin Dyer (University of Leeds)
Rudolf Fleischer (Fudan University)
Oscar Ibarra (UC Santa Barbara)
Hiroshi Imai (University of Tokyo)
Kazuo Iwama (Kyoto University)
Tao Jiang (University of California-Riverside/Tsinghua)
Satyanarayana Lokam (Microsoft Research-India)
D. T. Lee (Academia Sinica, Taipei)
Angsheng Li (Institute of Software, CAS, Beijing)
Giuseppe Longo (CNRS - Ecole Normale Superieure, Paris)
Tian Liu (Peking University)
Rüdiger Reischuk (Universität zu Lübeck)
Rocco Servedio (Columbia University)
Alexander Shen (Institute for Information Transmission Problems, Moscow)
Yaoyun Shi (University of Michigan)
Theodore A. Slaman (UC Berkeley)

Xiaoming Sun (Tsinghua University)
Shanghua Teng (Boston University)
Luca Trevisan (UC Berkeley)
Christopher Umans (Cal Tech)
Alasdair Urquhart (University of Toronto)
Hanpin Wang (Peking University)
Osamu Watanabe (Tokyo Institute of Technology)
Zhiwei Xu (Institute of Computing Technology, CAS, Beijing)
Frances Yao (City University of Hong Kong)
Mingsheng Ying (Tsinghua University)

Organizing Committee

Jin-Yi Cai (The University of Wisconsin-Madison, USA)
S. Barry Cooper (University of Leeds, UK)
Angsheng Li (Institute of Software, Chinese Academy of Sciences, China)
Hong Zhu (Fudan University, China)

Sponsoring Institutions

The National Natural Science Foundation of China
Chinese Academy of Sciences
Microsoft Research, Asia
Science and Technology Commission of Shanghai Municipality
Software School of Fudan University

Table of Contents

Plenary Lectures

Contributed Papers