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Cellular Automata

6th International Conference on Cellular Automata
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Proceedings

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Preface

"What joy to discern the minute in infinity, the vast to perceive in the small, what divinity!"
Jacob Bernoulli (1654-1705) in Ars Conjectandi (1713)

We are proud to present to you the proceedings of the Sixth International Conference on Cellular Automata for Research and Industry (ACRI 2004), held in Amsterdam, The Netherlands on October 25–27, 2004.

Since the first conference in Italy, ACRI, which is held biennially, has become the premier conference in the field of cellular automata in Europe and beyond, and is still growing in quality and size.

This year's theme was "From Individual to Collective Behavior", emphasizing the capability of Cellular Automata to simulate macroscopic processes from individual, local interactions. Cellular Automata, in spite of their apparent simplicity, represent a very powerful approach to studying spatio-temporal systems in which complex phenomena build up out of many simple local interactions. In the words of Richard Feynman in the Character of Physical Law (1982), "Nature uses only the longest threads to weave her patterns, so each small piece of her fabric reveals the organization of the entire tapestry".

John von Neumann, who is recognized as the father of cellular automata, would have been 100 years old in 2004. ACRI 2004 wanted to commemorate this date by inviting researchers to submit contributions related to von Neumann's work or to the emergence of organization in systems in which collaboration between components wins over the individual behavior.

In view of this commemoration we had two very inspiring memorial plenary lectures on the first day: *"Von Neumann's Century: Too many souls!"* by Prof. Tomasso Toffoli and *"John von Neumann and Cellular Automata"* by Prof. Roland Vollmar

Other invited lectures that were presented in the plenary sessions during the three meeting days were: *"Pattern Discovery and Automated Theory Building"* by Prof. James P. Crutchfield, *"Studying Biological Development and Evolution with Multilevel Particle Systems"* by Prof. Paulien Hogeweg, *"Cell Scale Simulations, the Neglected Link Between Microscopic and Continuum Modeling"* by Prof. James A. Glazier, *"From Cellular Automata to Wetware"* by Prof. Andrew Adamatzky, and *"Structural Design and Optimization Using Cellular Automata"* by Prof. Zafer Gürdal.

We would like to express our sincere thanks to the invited speakers who delivered such inspiring lectures at ACRI 2004.

The conference was organized along the following tracks:

- Methods and Theory
- Evolved CA
- Traffic, Networks and Communication

- Applications in Science and Engineering
- Bio-medical Applications
- Natural Phenomena and Ecology
- Social and Economical Applications

This volume contains peer reviewed original work on the theory and application of Cellular Automata. After peer review by three experts in the field, 40% of the 150 papers submitted were selected for oral presentation and 30% for poster presentation. A total of 30% of the submitted papers were rejected.

This conference would not have been possible without the support of many people and organizations that helped in different ways to make it a success.

First of all we would like to thank the authors for making the effort to submit so many high-quality papers. We thank the Program Committee for their excellent job in reviewing the submissions and thus guaranteeing the quality of the conference and the proceedings. We thank Liesbeth Otte and the conference office of the University of Amsterdam for their practical assistance and support. Many thanks go to Coco van der Hoeven for her secretarial work. Dick van Albada, Berry Vermolen and Jiangjun Cui are acknowledged for their punctuality in preparing the draft of the proceedings.

We thank our sponsors for their financial support: the board of the University of Amsterdam, the Science Faculty and the Institute for Informatics. Finally we thank the Dutch Science Foundation NWO, section Exact-Sciences, as well as the section Computational Life Sciences.

September 2004

Peter Sloot
Bastien Chopard
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