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DNA Computing

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Revised Selected Papers



Springer

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Preface

Biomolecular computing has emerged as an interdisciplinary field that draws together chemistry, computer science, mathematics, molecular biology, and physics. Our knowledge of DNA nanotechnology and biomolecular computing increases dramatically with every passing year. The International Meeting on DNA Computing has been a forum where scientists with different backgrounds, yet sharing a common interest in biomolecular computing, meet and present their latest results. Continuing this tradition, the 10th International Meeting on DNA Computing (DNA10) focused on the current experimental and theoretical results with the greatest impact.

The meeting took place at the University of Milano-Bicocca, Milan, Italy, from June 7 to June 10, 2004, and it was organized by the University of Milano-Bicocca and the Department of Informatics of the University of Milano-Bicocca. Papers and poster presentations were sought in all areas that relate to biomolecular computing, including (but not restricted to): demonstrations of biomolecular computing (using DNA and/or other molecules), theoretical models of biomolecular computing, biomolecular algorithms, computational processes in vitro and in vivo, analysis and theoretical models of laboratory techniques, biotechnological and other applications of DNA computing, DNA nanostructures, DNA devices such as DNA motors, DNA error evaluation and correction, in vitro evolution, molecular design, self-assembled systems, nucleic acid chemistry, and simulation tools.

Authors were asked to choose between two different tracks:

Track A — Full paper, for authors who wished to submit a full paper for presentation at DNA10 (oral or poster), and publication in the conference proceedings.

Track B — One-page abstract, for authors submitting experimental results, and who planned to submit their manuscript to a scientific journal, rather than publish it in the conference proceedings.

We received 67 submissions in track A and 27 in track B. Among them, 30 papers were selected for oral presentation. About 140 people attended the meeting.

The first day of the meeting, June 7, 2004, was dedicated to the following tutorials: N. Pavelka (Univ. of Milano-Bicocca), “Gene Expression Studies Using Microarrays,” H.J. Hoogeboom (Leiden University), “Basic Concepts of Computing for Biologists,” C. Henkel (Leiden University), “Basic Molecular Biology for Nonspecialists,” and T.H. LaBean (Duke University), “Self-Assembly.”

The next three days were devoted to invited plenary lectures and regular oral presentations. The invited plenary lectures were by K. Benenson (Weizmann Institute of Science, Israel), “An Autonomous Molecular Computer for Logical Control of Gene Expression,” C. Flamm (University of Vienna, Aus-

tria), “Computational Design of Multi-stable Nucleic Acid Sequences,” G. Păun (Institute of Mathematics of the Romanian Academy, Romania), “Membrane Computing — Power and Efficiency. An Overview,” J. Reif (Duke University, USA), “DNA-Based Nano-engineering: DNA and Its Enzymes as the Engines of Creation at the Molecular Scale,” and W.M. Shih (Harvard University, USA), “Clonable DNA Nanotechnology.”

The editors would like to thank all contributors to and participants in the DNA10 conference, the Program Committee (A. Carbone, J. Chen, N. Jonoska, L. Kari, C. Mao, G. Mauri, G. Păun, J. Rose, P. Rothmund, Y. Sakakibara, N. Seeman, E. Shapiro, L. Smith, R. Weiss, and H. Yan), and the external reviewers.

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January 2005

Claudio Ferretti,
Giancarlo Mauri,
Claudio Zandron

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