Nat Comput (2011) 10:335–336
DOI 10.1007/s11047-010-9231-z

Forward

Russell Deaton

Published online: 12 November 2010

This special issue of *Natural Computing* contains selected papers from the 15th International Conference on DNA Computing and Molecular Programming, which was held June 8–11, 2009 in Fayetteville, Arkansas at the University of Arkansas.

Under the auspices of the International Society for Nanoscale Science, Computation and Engineering (ISNSCE), the conference continued it strong tradition of presenting important research results and fostering interdisciplinary research. This annual conference focuses on topics that merge mathematics, computation, biology, and nanotechnology. Some examples are modeling of bionanoscale systems, using DNA oligonucleotides to guide the assembly of nanostructures, and implementing DNA-based computational devices for medical and other applications. The conference attracts top researchers in Computer Science, Mathematics, Chemistry, Physics, Molecular Biology, and Nanotechnology to foster interdisciplinary research in the molecular-scale manipulation of matter. To highlight the algorithmic emphasis and the increased breadth of the conference, "Molecular Programming" was added to the title this year. The papers in this special issue highlight the new name.

I wish to thank my co-chair of the organizing committee, Jin-Woo Kim, the program committee, and the steering committee. In particular, I wish to thank the set of anonymous reviewers.

The papers presented here are expanded and enhanced over the versions presented at the conference, and have a modeling and computational focus. Two papers model the capabilities and difficulties of self-assembly. These include "Distribute Agreement in Tile Self-Assembly" (by Sterling, which also won the student paper award at the conference) and "The Effect of Malformed Tiles on Tile Assemblies with the Kinetic Tile Assembly Model" (by Meng and Kashyap). One paper presents a bioinformatics application of DNA-inspired computing, "DNA Chips for Species Identification and Biological Phylogenies" (by Garzon and Wong). "NP-Completeness of the Energy Barrier Problem without Pseudoknots and Temporary Arcs" (by Maňuch, Thachuk, Stacho, and Condon) studies the computational complexity of secondary structure formation in RNA and DNA.

R. Deaton (✉)
Computer Science and Computer Engineering, University of Arkansas, Fayetteville, AR 72701, USA
e-mail: rdeaton@uark.edu

The remaining papers, "Strand Algebras for DNA Computing" (by Cardelli), "Complexity-Preserving Simulations among Three Variants of Accepting Networks of Evolutionary Processors" (by Bottoni, Labella, Manea, Mitrana, Petre, and Sempere), "Design of a Biomolecular Device that Executes Process Algebra" (by Majumder and Reif), and "A Renewable, Modular, and Time-Responsive DNA Circuit" (by Goel and Ibrahimi), propose new models or extend existing models of molecular computation.