

## **Cellular Automata and Models of Computation**

### **Preface**

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This issue contains seven papers presented during the “Third Symposium on Cellular Automata–Journées Automates Cellulaires” (JAC 2012), held in La Marana, Corsica (France) in the period September 19th–21th, 2012.

The scope of the symposium is centered on Cellular Automata (CA), tilings and related models of computation. Topics of interest include (but are not limited to) algorithmic, computability, complexity, formal languages, symbolic dynamics, topological, ergodic, algebraic, and structure aspects of these models.

After an additional review process, seven papers were selected and included in this special issue. They are now presented in an extended and improved form with respect to the already refereed workshop version that appeared in the proceedings of JAC 2012.

Pablo Arrighi, Nicolas Schabanel, and Guillaume Theyssier have contributed the article titled “Stochastic Cellular Automata: Correlations, Decidability and Simulations” which deals with deterministic, non-deterministic, and stochastic cellular automata. The authors extend the notion of intrinsic simulation between deterministic cellular automata to the non-deterministic and stochastic settings, and consider the decidability issue of the related problems.

In the paper “On Completeness and Decidability of Phase Space Invertible Asynchronous Cellular Automata”, Simon Wacker and Thomas Worsch introduce asynchronous cellular automata which are invertible in a certain sense. They show results about the computational completeness of some of these automata and the decidability problem concerning the invertibility for two classes of asynchronous cellular automata.

Alberto Dennunzio, Pietro Di Lena, Enrico Formenti, and Luciano Margara in the paper “Periodic orbits and dynamical complexity in Cellular Automata” study the set of strictly temporally periodic configurations for surjective cellular automata. They investigate the relation between the size of this set and the dynamical complexity of a given automaton in both the general and additive CA setting.

Cellular automata and iterative arrays are investigated as parallel models to compute transductions by Martin Kutrib and Andreas Malcher in “One-Dimensional Cellular Automaton Transducers”. In particular, the authors study the computational capabilities of these models and compare them with the sequential finite state transducers and pushdown transducers.

The paper “Two-Way Finite Automata: Old and Recent Results” by Giovanni Pighizzini is a comprehensive survey of two-way finite automata. The author provides a summary of old and recent results reflecting the state-of-the-art in this field, and discusses the related techniques and problems.

Katsunobu Imai, Takahiro Hatsuda, Victor Poupet, and Kota Sato investigate in the paper “A 6-state Universal Semi-totalistic Cellular Automaton on Kite and Dart Penrose Tilings” some properties of semi-totalistic cellular automaton on the well-known quasi-periodic kite and dart tiling of the plane presented by Penrose. The authors devise a semi-totalistic cellular automaton with 6 states that is computationally universal in some sense.

Countable two-dimensional subshifts of finite type are considered by Ville Salo and Ilkka Törmä in “Constructions with countable subshifts of finite type”. The authors present constructions of such objects that provide tiling systems with interesting properties concerning their topological derivatives and sub-patterns posets.

We would like to warmly thank the authors for their works and efforts which made this special issue possible. Special thanks go to all referees for their valuable contributions both during the selection and the final review process. Finally, we also want to thank Professor Damian Niwinski for offering us the opportunity to publish this special issue in *Fundamenta Informaticae*.

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