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Preface

This volume of Journal of Cellular Automata is devoted to a selection of articles related to presentations at the 13th international Conference on Cellular Automata for Research and Industry – ACRI 2018 held at Como in Italy on September 23-26, 2018. The accepted papers presented at the conference were included in a LNCS volume. Among them a selection of high quality papers has been considered and authors were invited to produce an extended version to be published in this special issue of journal of Cellular Automata. Each submitted article received at least two detailed reports for the final recommendation.

The papers included in this special issue cover theoretical aspects as well as practical applications related to cellular automata (CA) that are both a parallel computational paradigm and an archetype for modelling complex systems, that evolve according to local interactions.

The first paper, [**Chraibi and Steffen**] shows how a standard CA model can be modified to produce a realistic movement of people around bends and obstacles by changing the standard floor field. As pointed out, a simple CA model is strongly non isotropic, and the authors introduced position probabilities to overcome this defect and three types of cells; normal cells, convergence cells and divergence cells are defined in the simulation field.

The second article [**Di Gregorio**], explores the properties of the standard binary positional representation embodied in a CA together with the addition operation and the corresponding ones of a redundant binary positional representation, the rules and time cost for the passage from standard numeral system to redundant one and vice versa. The presented results allow to individuate the CA computation context, when redundancy could be exploited advantageously.

The paper [**Kayama** *et al.*], displays a novel variant of CAs named F-CA, inspired in a fractal projection of neighborhoods in the space. The analysis was done in one dimension and this paper extends and explore to two dimensions. Some outer-totalistic functions are presented to solve classic problems as cryptography from reversible rules.

[**Abdennour *et al.***] proposes a CA approach for modeling electrical performances and temperature field of standard photovoltaic (PV) panels. The proposed CA model describes the dynamics of a solar cell operation mode based on the coupling of their temperature and electrical output characteristics. The authors provide an extensive mathematical description of their model that analytically illustrates its operation.

In [**Graudenzi *et al.***], metabolic properties of cells and the emerging population dynamics of multi-cellular systems are invistigated by means of a multiscale modelling framework named FBCA (Flux Balance Cellular Automata). A simplified model of intestinal crypt is considered to illustrate the approach.

The paper [**Stepien and Stafiej**] provides an approach to simulate the corrosion and passivation at a metal surface by means of asynchronous cellular automaton studied under galvanostatic control. Interesting real features were reproduced in the performed computer simulation.

Paper [**Bagnoli and Rechtman**] studies some important properties exhibited in the dynamic evolutions of probabilistic cellular automata. It focuses on the regional master-slave synchronization of a one dimensional probabilistic cellular automaton with two absorbing states. It shows that the synchronization in a fixed size region can be achieved when the master is acting on its boundary.

Finally, [**Nguyen and Maignan**] proposes a methodology to optimize transition tales for cellular automata using cellular fields. It explores this new and interesting direction on the synthesis of FSSP (Firing Squad Synchronization Problem) solutions and gives a comparison with the Noguchi's 8-state solution.

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