

Preface

The fifth (5th) International Workshop on Crowds and Cellular Automata (C&CA) and the third (3rd) International Workshop on Traffic and Cellular Automata (TCA), were organized in the framework of the eleventh edition of ACRI 2014 Conference (Cellular Automata for Research and Industry) in Cracow, Poland.

Following the previous C&CA and TCA editions, which were held in conjunction with ACRI Conferences in Perpignan, France (2006), in Yokohama, Japan (2008), Ascoli Piceno, Italy (2010) and Santorini, Greece (2012), both workshops gathered researchers and practitioners interested in CA-originated modeling and simulation, as well as analysis and practical applications.

The specialization of the C&CA Workshop arrives from researches on complex crowd dynamics (with focus on CA-based simulation methods), while TCA workshop is related to traffic modeling, including city traffic systems, as well as highway traffic.

Topics of both the workshops include, but are not limited to:

- crowd dynamics
- pedestrian behaviour
- spatial competition
- urban design and planning
- social self-organisation
- collective beliefs and behaviour
- competition, collaboration
- social structures
- traffic modeling (highway and urban traffic, public transport etc.)
- analytical methods

- computer simulations
- empirical results, experiments and data analysis
- engineering applications
- traffic networks
- related systems (biological transport, granular flow etc.)

A major part of these topics is covered by the content of this special issue. In specific, eight papers are presented in the Special Issue, five of them related to crowds and CA and three to traffic issues modeled by CA.

The paper by Kenichiro Shimura, Sultan Daud Khan, Stefania Bandini and Katsuhiko Nishinari titled: *Simulation and Evaluation of Spiral Movement of Pedestrians: Towards the Tawaf Simulator* is devoted to simulation of pedestrians making spiral movement circulating around the central object. The authors use Cellular Automata with square lattice and static floor fields in polar coordinate. The authors compare video recordings from some social and religious events with simulations results.

In the article by Robert Lubaś, Jakub Porzycki, Jarosław Wąs and Marcin Mycek, titled *Validation and verification of CA-based pedestrian dynamics models*, some issues of verification and validation (V&V) of Cellular Automata based pedestrian dynamics models are discussed. The authors analyze: the negative effects of discretization, pedestrian speed in different grid configurations, wall penetration, as well as the role of fundamental diagram in validation and verification of CA models.

Mohcine Chraïbi and Bernard Steffen in the article *Multiscale Simulation of Pedestrians for efficient Predictive Modeling in Large Events* present a multiscale approach in pedestrian dynamics modeling using a force-based model and a cellular automaton. The authors present a modification of a classical CA method dedicated for hybridization, as well as some issues of inserting agents into force-based models at positions and speeds optimized for smooth walking.

The article titled *A CA-based Model with Virtual Field for Guided Evacuation of People with Motion Difficulties* by Eleftherios Spartalis, Ioakeim G. Georgoudas and Georgios Ch. Sirakoulis is devoted to CA-based simulation of movement of pedestrians with motion difficulties. The presented model is based on a virtual potential field. The authors take into consideration various scenarios, as well as influence of different layouts, obstacles, group categorization, crowd guiding and fire spreading.

Marek Bukáček and Pavel Hrabák in their article: *Boundary Induced Phase Transition in Cellular Automata Models of Pedestrian Flow* introduce a cellular automaton model for pedestrian flow modelling with a principle of bonds and an adaptive time-span. The open boundary problem of a

walk-through room is analyzed in the work and a special focus is given to boundary induced phase transition from free flow to congestion.

Hui-Xuan Li, Chun-Fu Shao, Hao-Ling Wu, Jun-Fang Tian and Ying-Da Zhang in the paper *Cellular Automata Approach for Modeling Lane Changing Execution* take into consideration process of lane changing in traffic flow in the context of a two-lane CA-based model. The authors analyze different variants of such models, including slow-to-start rule and the whole execution process.

Lars Habel and Michael Schreckenberg in the article titled *Analysis of Asymmetric Lane Changing in a CA-based Highway Traffic Model* present a model based on CA for simulating multi-lane highway traffic with asymmetric realistic lane change rules in order to distinguish between driving lanes and overtaking lanes. The model parameters analysis reports on their relationships to lane usage, and to numbers of lane changes (at varying density).

Takahiro Tannai and Katsuhiko Nishinari in the article *Propagation of Congestion in TASEP Network* present the study of dynamic propagation of congestions in vehicular traffic by CA-based approach and derive conditions enable modeling of the congestions. The authors analyze TASEP network (Totally Asymmetric Simple Exclusion Process) with an aggregation point and a branching point in order to investigate the correlation among multiple junctions.

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Sara Manzoni
University of Milano-Bicocca, Italy

Katsuhiko Nishinari
The Tokyo University, Japan

Andreas Schadschneider
Institute of Theoretical Physics – Cologne, Germany

Jarosław Wąs
AGH University of Science and Technology, Poland