

Introducing Probabilistic Cellular Automata. A Versatile Extension of Game of Life

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Abstract

The “Game of life” [1] model was created in 1970 by the mathematician Jonh Horton Conway using cellular automata. Since then, different extensions of these cellular automata have been used in many applications, such as car traffic control [2] or baggage traffic in an airport [3]. These extensions introduce ideas not only from cellular automata models but also from neural networks theory.

In this work, we introduce probabilistic cellular automata which include non-deterministic rules for transitions between successive generations of the automaton together with probabilistic decisions about life and death of the cells in next generation of the automaton. This way, more realistic situations can be modeled and the obtained results are also non-deterministic.

As an example of use, an implementation of this probabilistic cellular automaton has been developed using it for simulating tissues evolution. The authors are specially interested in simulations of cancerous tissues.

References

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