Stability of Cellular Automata

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Our research into stability of cellular automata involves a so called Lyapunov exponent, introduced in 1992[1]. The approach allows one to measure the influence that a defect has on the evolution of an automaton. We aim to obtain values for the elementary 256 binary CA of local range 1. The complexity of the task varies. Generally, the defect path can take different forms depending on the initial configuration, thus the exponent of a given CA may have several values with certain probabilities. We would like to develop a level of understanding of the topic in order to introduce a valid measure and tackle more complicated or higher dimensional examples of cellular automata.

 F. Bagnoli, R. Rechtman, S. Ruffo. Damage spreading and Lyapunov exponents in cellular automata. *Physics Letters A* 172, Issues 1-2 (1992), 34-39. https://doi.org/10.1016/0375-9601(92)90185-0