

In this thesis we research the possibilities of using cellular automata for lossless data compression. We describe the classification of cellular automata and their current usage. We study the properties of various types of elementary cellular automata (i.e. Wolfram rules), describe their equivalence classes, the ways of forward as well as backward simulation, we examine the rules with interesting behavior. The states provided by these rules are evaluated in terms of their orderliness (e.g. the ratio of living cells or approximation of entropy). We implement some standard compression algorithms and compare them in terms of usability for best rated states. By application of acquired knowledge we propose a new compression algorithm, test it on text and image data and compare the results with traditional compression algorithms.