CS 420

Project 1

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**Classification of 1D Cellular Automata**

**Project Report**

**Abstract:**

In current project report, the task was to explore “Edge of Chaos” phenomena or Wolfram class IV behavior in 1D Cellular Automata (CA). The goal was to run several experiments. At each experiment, random rule table (string) was generated. Rule string had to be decimated (zeroing one entry) until completely zeroed producing fixed number of steps for each experiment. At each step, simulation was run generating images of CA behavior. Next exercise was to observe patterns formed by CA, to classify them, and to calculate Langston’s Lambda and Entropy parameters. From retrieved data 4 graphs were built and analysis was done, explaining correlation between parameter values and the class behavior.

**Question:**

Draw conclusions about the range of values of that lead to class IV behavior.

1. Are there any anomalies like:
   1. Class I or II at high parameters values?
   2. Any class III or IV behavior in I,II region?
2. Any other correlations between the parameter values and the class behavior ?

**Variables:**

Number of experiments = 40

Radius of cell’s relevant neighborhood, r = 1

Number of states, k = 5

0 – pink

1 – blue

2 – green

3 – yellow

4 – red

Seed for random string generation = -8999515360070250000

**Discussion:**