An Investigation of Cellular Automata Dynamics

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Introduction

John Conway's Game of Life consists of a field of square cells, each of which can be alive or dead and has eight cells around it. Under his rules, every living cell that had exactly two or three living neighbors would survive into the next generation. Every dead cell with exactly three living neighbors would be alive in the next generation. This project enables different cells to have different rulesets; every cell that is born inherits its rules from the cells around it, but can also mutate, based on a probability also inherited from its neighbors.

Abstract

John Conway's Game of Life showed that simple rules can generate amazingly complex patterns. Using variations of the rules he devised, one can learn about the advantages of different sets of rules and the implications for simple evolution and chaos theory.

Procedures

The field is initially set with two or more rulesets active; each cell will be randomly set to be alive or dead, and its neighbors will share its rules.

After one set dominates the board, it and its opponents will be recorded.

This data will be used to judge the success of different rulesets in different situations.

Conclusions

It has already been observed that certain types of rulesets are more successful on a crowded board. With further development, the analysis will become automatic, not user-controlled.