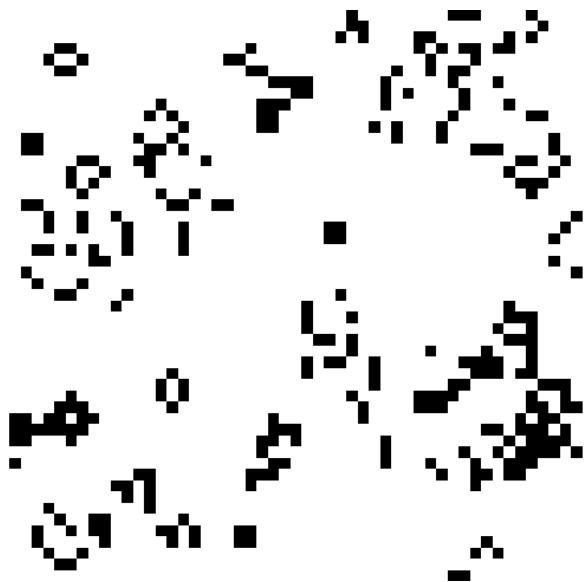


REPAST MODELS LIBRARY: GAME OF LIFE (RELOGO)

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INTRODUCTION

This is an implementation of *Life*, a cellular automaton developed by John Horton Conway in 1970. It is one of the earliest known examples of an agent-based model. In the model, cells live and die according to some simple rules:

- A living cell with exactly 2 or 3 living neighbors remains alive (where a cell's neighbors are the 8 surrounding cells); otherwise, it dies.
- A dead cell with exactly 3 living neighbors becomes alive.

USAGE

Select the **Initial Density** of living cells, then click the **Setup** button to initialize and the **Go** button to run the model. The value for **currentDensity** tracks the proportion of living cells while the model runs.

EXERCISES

- As you run the model, you may notice objects that exhibit common behaviors such as stills (objects that do not change), oscillators (objects that repeatedly cycle through a series of patterns), and gliders (objects that travel across the screen). Identify some other interesting behaviors and create your own objects that exhibit these behaviors.
- Modify the rules that govern how cells live and die to create your own cellular automaton. Note any patterns that you observe.
- Implement this model using turtles instead of patches.

RELOGO FEATURES

In this simple model, it is tempting to oversimplify the code by using only one **ask** block to update the cells. This causes the cells to update sequentially rather than simultaneously, which can lead to certain patterns not behaving as expected. Instead, a second **ask** block is needed beforehand to gather information about each cell's neighbors, and the cells are then updated in a separate **ask** block.

REFERENCES

Gardner, M. (1970). Mathematical Games: The Fantastic Combinations of John Conway's New Solitaire Game "Life." *Scientific American*, 223, 120-123. http://ddi.cs.uni-potsdam.de/HyFISCH/Produzieren/lis_projekt/proj_gamelife/ConwayScientificAmerican.htm