The Forest Automaton

What it Models

The forest automaton models the life and growth of a forest. The forest may start with a single tree and as that tree ages, its seeds will grow new trees nearby. Then as those new trees age, their seeds will spawn new trees. This pattern will continuously repeat until a full forest of tree has grown around that single tree. However, trees die as they age and fall. These fallen trees decay and provide nutrients to the surrounding trees causing them to grow faster and fallen tree can sometimes spawn new trees from seeds still present on the tree. This allows the forest to continue growing even as trees die. Another event that regularly occurs throughout the life of a forest is new trees dying from lack of sunlight. This occurs because the surrounding trees may be too tall and block too much sunlight from reaching the new tree.

States of a Cell

Each cell in the automaton represents a tree. Each cell can be in one of three states. The first one being alive, meaning that the cell contains a live tree. The second state is dead meaning that the cell contains a tree that has died, from either age or lack of sunlight. The final state is empty meaning that the cell does not currently contain a tree, alive or dead.

Alive cells may be any shade of green. The darker the green the older the tree is. Dead cells are brown to show a decaying tree. Empty cells are simply black.

Evolution Rules

A cells state in the next generation depends on six factors:

1. Any live cell for which the average age of neighboring cells is larger than its current age by at least six will die from lack of sunlight.
2. Any live cell with an age of eight or greater has a 5% chance of dying from age.
3. Any live cell has a 20% chance of ageing every generation.
4. Any live cell that has aged in the current generation and has a neighboring dead cell will age twice due to absorption of nutrients from the dead cell.
5. Any dead or empty cell with a live neighbor that has an age of six or greater has a 50% chance of becoming alive from a seed dropped from the neighboring tree.
6. Any dead cell has a 5% chance of becoming alive due to a seed left behind from the old cell.

Sample Evolution