19 Game of Life

This was written about by Martin Gardner.

Here the cellular automaton is a grid. Each cell has its neighbors the 8 cells around it. Each cell is either occupied or empty. (Think live or dead.) The rules are:

- If cell occupied and ≤ 1 neighbor, then cell dies (lack of support).
- If cell occupied and ≥ 4 neighbors, then cell dies (overcrowding).
- If cell occupied and 3 or 4 neighbors, then cell remains occupied.
- If cell empty and ≤ 1 neighbor, then cell becomes occupied (birth).

Sometimes converges to a stable picture, sometimes converges to an oscillation, sometimes dies out, and sometimes diverges. Simple examples include: beehive, blinker, glider.

The interesting result (Gosper) was that the number of occupied cells can go to infinity. The cellular automaton can be thought of as a Turing Machine (that is, a model with the same power as a computer).

Many variations of Game of Life, most notably the update rules. The original game is sometimes referred to as B3/S23, meaning birth with 3 and survive with 2 or 3 neighbors.

One can also introduce randomness. And extend to multiple states, e.g., cell as being empty, predator or prey. See the website by Matveev: http://web.njit.edu/~matveev/Javascript/jjj.html

References

Wikipedia.