Cellular Automata

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Basis of Cellular Automata

Cellular automata are structures created by iterative operations done on a set of cells in a generation defined by a predetermined rule set. This rule set generally involves the values of the neighboring cells. These rules can create figures with regular patterns and beautiful art or ones with seemingly random designs. Two methods of figuring out a value of a cell are listed below:

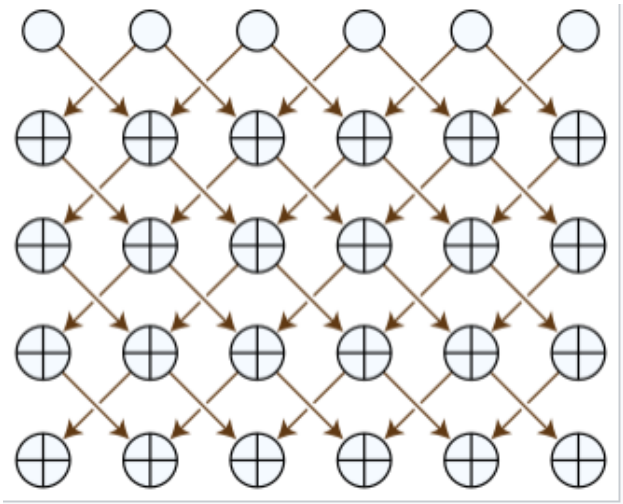
- Neighbour States
- Empirical Formula

Neighbour Cell State Rule

current pattern	111	110	101	100	011	010	001	000
new state for center cell	0	1	0	1	1	0	1	0

The above rule set is what defines Rule 90. It takes into account the values of the above neighboring cells where 1 is filled in and 0 is not filled in. For example, 110 means filled in, filled in, and not filled in. This will result in our current square being filled in.

Empirical Formula



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X[i,j] = (rule/(2**(4*X[i-1,j-1] + 2*X[i-1,j] + X[i-1,j+1]))) % 2
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The above image is a visual representation of the formula used to generate any cell we input. For example we can use the formula to figure out the value of (40,50) if we wanted by plugging it into our formula.