Cellular Automata ("CA")

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- Cellular automata deal with building a system of many objects that have varying states over time. These objects ("cells") have the following characteristics:

1. A cell lives on the **grid.**
2. Each cell has a **state.**
3. Each cell has a **neighborhood.**

- A cellular automaton having all these three basic properties stated above living over time is also called the **generation** or **frame count** of an animation.

- We basically have a generation 0 at time equals 0, and from generation 0, we compute states of cells in generation 1, generation 2, and so on using a recursive relation as follows:

  CELL(t) = f(CELL neighborhood at t - 1)

- CELL represents an individual cell in the above relation, and f is some function of a given cell's neighborhood at time t - 1.

- In one-dimension, the standard Wolfram model is to start generation 0 with all cells having a state of 0 except for the middle cell, which would have a state of 1.

- To create a new generation from the previous generation, we have a ruleset that looks at all the possible configurations of a cell and its neighbor and defines the state outcome for every possible configuration.

- The simple act of creating a CA and defining a ruleset does not guarantee visually interesting results. Out of all 256 (8-bit ruleset) rulesets, only a handful produce compelling outcomes.