



## Cellular automaton

By Frederic P. Miller

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 - A cellular automaton (pl. cellular automata, abbrev. CA) is a discrete model studied in computability theory, mathematics, physics, theoretical biology and microstructure modeling. It consists of a regular grid of cells, each in one of a finite number of states, such as 'On' and 'Off'. The grid can be in any finite number of dimensions. For each cell, a set of cells called its neighborhood (usually including the cell itself) is defined relative to the specified cell. For example, the neighborhood of a cell might be defined as the set of cells a distance of 2 or less from the cell. An initial state (time  $t=0$ ) is selected by assigning a state for each cell. A new generation is created (advancing  $t$  by 1), according to some fixed rule (generally, a mathematical function) that determines the new state of each cell in terms of the current state of the cell and the states of the cells in its neighborhood. For example, the rule might be that the cell is 'On' in the next generation if exactly two of the cells in the neighborhood are 'On' in the...



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