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## **Machine Learning with Cellular Automata via Evolution with Genetic Algorithms**

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### **Abstract**

This presentation is about evolution of cellular automata with genetic algorithms - a demonstration and analysis using a simulated environment.

The presentation seeks to address the viability, use cases, advantages, and limitations of machine learning with cellular automata. The main driving force behind studying the capabilities of this area is that unlike neural networks, the details of a system using finite automata can be understood by human intellect.

Our method of choice for this study is creating a specific environment which provides food sources (fruits on trees) and poses threats (predators) to automata. Each automaton represents a living being trying to survive in the environment.

We keep track of their health, which increases when they are near food, and decreases when they are near threats. Reaching the positive end of the health spectrum results in "children" being born and reaching zero deletes the automata.

Running these simulations in a great quantity allows us to determine how viable finite automata trained this way are as a replacement for neural networks in certain situations, and how hard it is to analyze how they make decisions.

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