

Team Number: 1

School Name: Portales High School

Area of Science: Artificial Intelligence

Project Title: Using Neural Networks to Play Games

Problem Definition

Games simplify complex problems and make strategies emerge. Games are also a way to keep people occupied and their brains active and engaged. By creating systems to effectively play games, these problems can be solved with ease and people who would otherwise be unable to play games can.

Problem Solution

Artificial intelligence can easily play games to entertain and find strategies. In artificial intelligence's infancy, a brute force method of looking at large number of moves was used. However, recently artificial neural networks have been created. These neural networks work very much like a human's brain. To make these brains become intelligent they have to be trained so that their networks are able to actually respond to different stimuli. In our project we will use artificial neural networks to play competitive strategy games. ("Artificial...")

Progress to Date

As of now, we have created an artificial network that can be trained against a set of data by using genetic algorithms. A network is a collection of nodes that are organized into layers: the input

layer, hidden layer(s), and the output layer. Inputs are fed into each node, which then puts the input through a transfer function. After this, each node will take the output of the transfer function and distribute it to each of the nodes in the next layer. Between each node in adjacent layers is a connection. This connection carries a specific weight, and its value is what affects how the network processes inputs. (“Artificial...”) In our program, we store the weight of each connection for a given network in what we call a “genome.” This “genome” can be used to “breed” two networks in the genetic algorithms. What the evolutionary algorithms do is create multiple neural networks in a generation. The generation is evaluated to find which networks perform the best to fit our needs, and the top percent of the generation is bred together to form the new generation, each generation becoming slightly better than the previous. (MathWorks) This process is similar to natural selection, the fittest members of a population pass on their genes better than less fit members, improving the generation over time (Berkeley).

Expected Results

We expect to create a neural network that can be trained to play games. We will also teach these neural networks using different strategies to train them against: AI (minimax), random move, other artificial neural networks, and humans. By using different training regimens, we will be able to explore how different strategies and their combinations teach the neural networks. Since neural networks learn, the more time that they train, the better they become. Using the knowledge of how to best train the networks we will perform numerous cycles of network training, to create a neural network that is highly proficient at playing a game.

Works Cited

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