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Implemented AI Component

We implemented a neural network.

We started our neural network implementation with a basic neuron class. This class is responsible for holding weights, biases, thresholds, and references to parent neurons. This basic neuron class is what we're daisy-chaining to create our neural network. We have three layers of neurons linked together, an input layer, a hidden layer, and an output layer. The input layer takes in input from the game state, compares it against its internal weights and biases, and passes on an output value to the next layer if the activation threshold is exceeded. We have five input neurons setup corresponding to the five distances that we're measuring from the AI agent. Our hidden layer takes the outputs from the input layer and runs it through another round of processing by comparing weights, biases, and activation thresholds before returning yet another output value to the final output layer. The output layer neurons check that final input against its activation threshold and invokes a game event for the AI if the threshold is met or exceeded. These actions include turning, accelerating, and/or decelerating. We measure a fitness value for the AI agents based on their progress on the test track and mutate the worst performing agents based on the weights and biases of the best performing agents. Eventually, as the better agents evolve and the worse agents copy the progress of the better agents, we'll end up with agents capable of performing our task well.

Function of AI Component

The AI Neural Network is the center piece in this simulation, where the goal is to train the AI in order to eventually have it run perfectly no matter what configuration of tracks it's tasked with driving through.

Operation of Application

The application runs automatically, spawning 20 cars into the scene. The cars will drive as far along the track as they can until they either crash or are culled after failing to make significant progress. The user can explore the neural network in motion by looking at different cars and changing the runtime speed using the arrow keys. Neural networks of focused cars will be visualized on screen using nodes and lines that represent neurons and their weighted connections.

Questions:

1. Which is not a layer used in Neural Networks?
 - a. Output Layer
 - b. Hidden Layer
 - c. Transfer Layer - Correct
 - d. Input Layer

2. Can a Neural Network have more than one hidden layer?

- a. Yes
- b. No
- c. Yes, and they should
- d. Yes, but more than one often provides no additional benefit - Correct

3. Which neural networks get mutated?

- a. The most fit neural networks
- b. The least fit neural networks - Correct
- c. Random neural networks
- d. The last neural networks in the list