Training a Neural Network to Sail a Virtual Sailboat

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My Project

The goal of my project is to train an Artificial Neural Network to pilot a small sailboat. Due to the difficulties and expense of a real world implementation, I decided to train the network with a virtual sailing simulator.

I chose to use Sail Simulator 5 as the simulator in my project, because it is sufficiently realistic and the information about the state of the boat and environment is easily accessible to external programs.

My Neural network is fully connected, with one input layer, one hidden layer and one output layer and it uses the back propagation algorithm for learning.

My Neural Network (Overlord)

The Neural Network I constructed is a 3 layer, fully connected neural network that uses a back propagation algorithm to facilitate synaptic learning. It takes the following information: wind speed, wind direction, boat speed, boat direction, boat latitude and longitude and waypoint latitude and longitude. It uses this information to produce sail and rudder positions that will be passed back into the simulator.

Controller

As of right now I have a program that reads the output stream from the Sail Simulator, runs the data through the Neural Network and uses the output to tell the controller to turn the rudder left or right and to tighten or loosen the main sheet. But I don't have a controller program, so the controller is me.

Sail Simulator 5

Developed by Stentec Software. The developers of this software have been a great help in the course of this project. They modified their simulator so that it would output the information that I required. Sends information via serial port connection. That is read by a translator program that passes information to the neural network.

Future Work

- Collaboration with Stentec Software to incorporate a neural network into their simulator
- Using the Neural Network to sail a real boat