CALIFORNIA STATE SCIENCE FAIR
2016 PROJECT SUMMARY

Name(s)
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Project Number
J1419

Project Title
Fractal Learning: A Better Approach to Neural Networks?

Abstract

Objectives/Goals
Are Fractal Neural Networks more efficient than Feed-Forward Neural Networks in their accuracy of outputs, RMS error values, and overall learning growth and progression? My hypothesis is that #Fractal# Neural Networks are more efficient because of their sub-network properties and changing of weighted links. I think this is because the weighted links adjust to the output values of the sub-networks and make the net learn more efficiently.

Methods/Materials
For my experiments, I started with a pre-existing Feed-Forward Neural Net as a Control group, and then modified it to become a Fractal Neural Net. The nets were written in C++. To test the nets, I prepared nine different data sets to train the neural nets. The data sets ranged in difficulty and topic and were downloaded from the UCI Machine Learning Repository.

Results
After learning each data set, the Fractal Neural Net showed similar learning growth to that of the Control, and also had similar output and RMS error values as well. Even though these values were similar, the Control had values that were more efficient more often. Overall, the Control beat the Fractal Net four times, tied with the Fractal Net four times, and lost to the Fractal Neural Net once.

Conclusions/Discussion
My final conclusion is that the Fractal Neural Network is less efficient than Feed-Forward Neural Network.

Summary Statement
I compared two types of neural networks, a Fractal Net, and a Feed-Forward Net, at a variety of datasets to determine which was more efficient.

Help Received
None received. I made the Networks off of a code-base online, and based off of a paper done by Roderick Murray Smith, a professor at the University of Glasgow