

Advanced Applications of Neural Networks 2006-2007

Jeff Chen

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Abstract

Neural networks are a novel and powerful way of finding patterns and functions. In that way, they are ideal for applications like predicting the stock market, compressing data and analyzing musical compositions. Furthermore, different types of neural networks have different strong points; this project will attempt each of the applications with various types of neural networks.

Keywords: neural network, function approximation

Purpose

The purpose of this project is to present a viable solution using neural networks to applications including predicting the stock market, efficient compression of data, and the analysis and composition of music. The stock market has frustrated investors for years, and attempts to find patterns in stocks have mostly failed. Neural networks may be a great solution to this problem, since neural networks don't have the restrictions of continuity of functions, and even several "neurons" in a network may simulate a function of numerous variables.

Similarly, musical compositions are hard for computers to compose. The use of neural networks is to predict notes on a musical scale based on previous notes in the composition. Once the network is able to do this, it is a small step to seed the network with several notes and let it compose the piece on its own.

Background

An artificial neural network is a series of "neurons" which are connected to each other, making a neural network. Each connection between neurons has a weight to it, which is modified to alter the behavior of the network; this is how a network learns. The most common type of neural network is the backpropagation network. In this network, neurons are arranged in layers, with each layer connecting to the next and previous layers, but to neurons in their layer. The first layer is the input layer, and the last layer is the output layer. The intermediate layers are hidden layers. This type of network learns when input and desired output is given. The network then figures out the error between actual output and the desired output, then propagates the error backwards and modifies the weights accordingly.

First Quarter Goals

This quarter will be spent researching the various types of neural networks, and coding each to make sure they work. Then the networks that work best will be selected for testing with the applications.

Second Quarter Goals

This quarter will be spent applying the various networks to the applications, and begin to collect data for testing.

Third Quarter Goals

This quarter will be spent coding up a graphical view of the networks, and modifying the code to be more efficient.