

Exploration of deep learning on the Bristol Stock exchange

Introduction

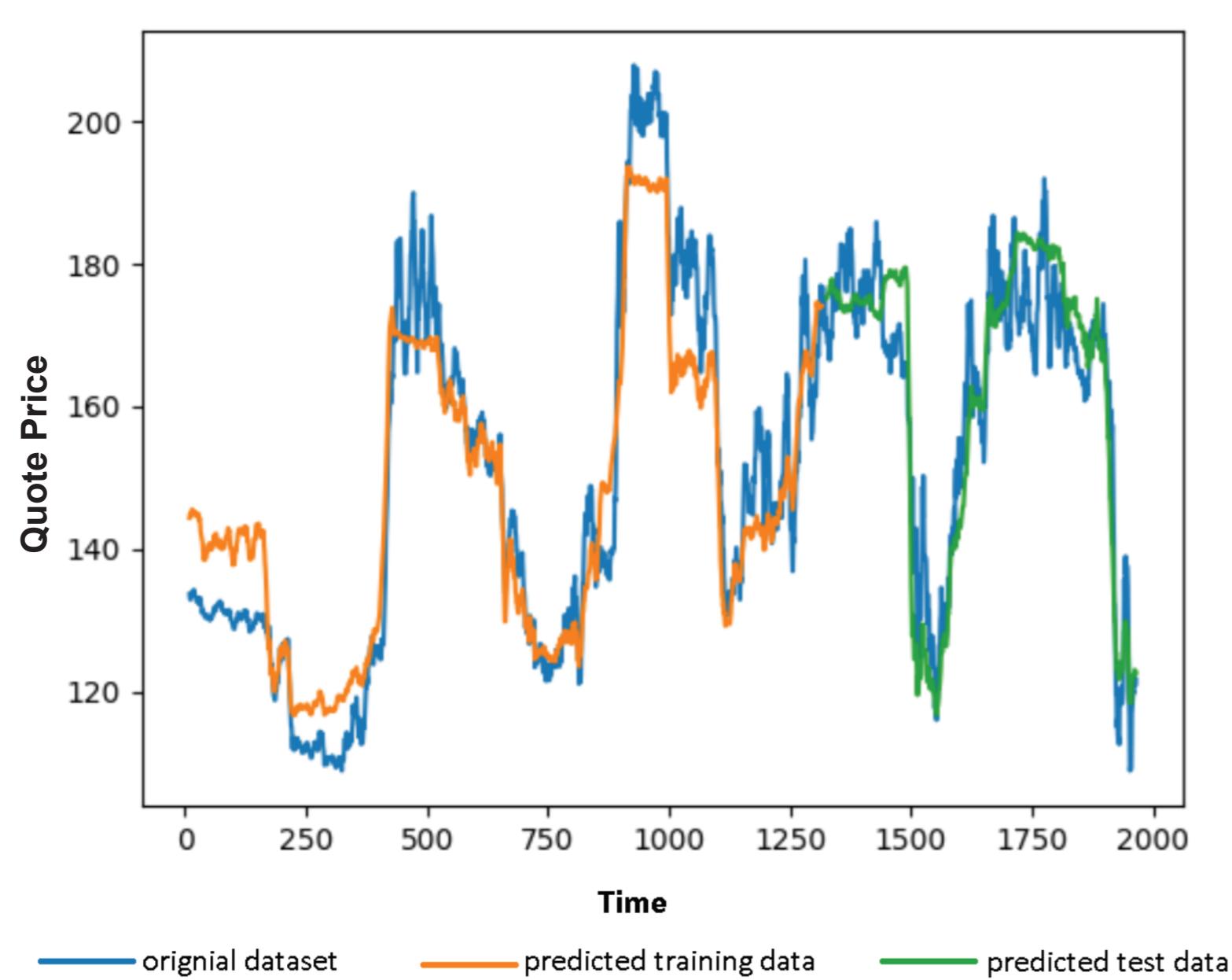
The transition of markets from paper based to computer based has opened the door to many automated trading systems. These include both algorithms and machine learning. Some of these algorithms have proven to be successful in the past including the ZIP algorithm. We shall replicate and extend work that explored whether neural networks can replicate the actions of a ZIP trader. The market used is the Bristol Stock Exchange, which is a simulation of a continuous double auction.

ZIP algorithm

The ZIP trading algorithm places orders in the market based on the following equation $P = L + L * M$ where P is the quote price, L is the Limit price and M is the profit margin. The profit margin is adjusted using a learning rule based on the current state of the market.

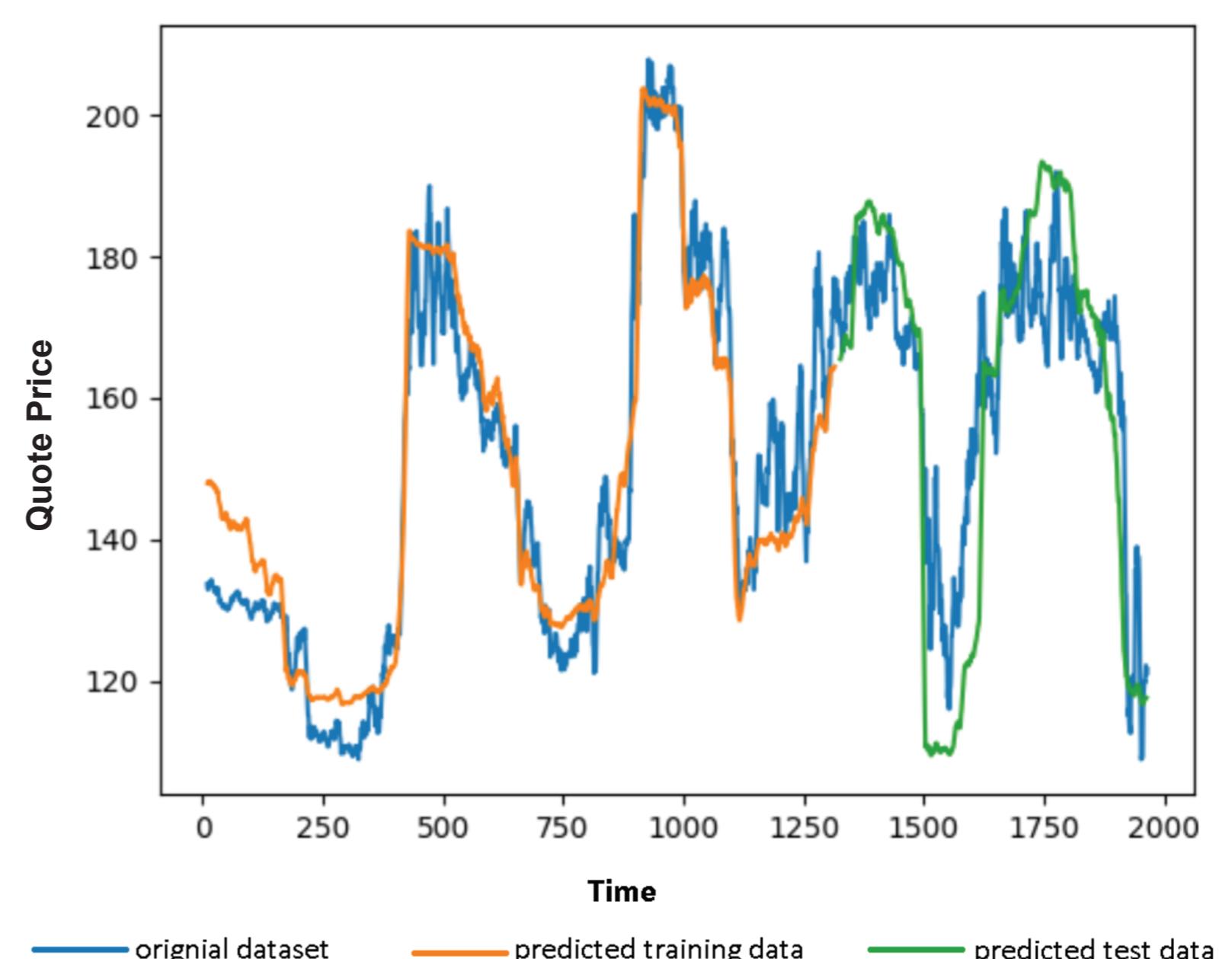
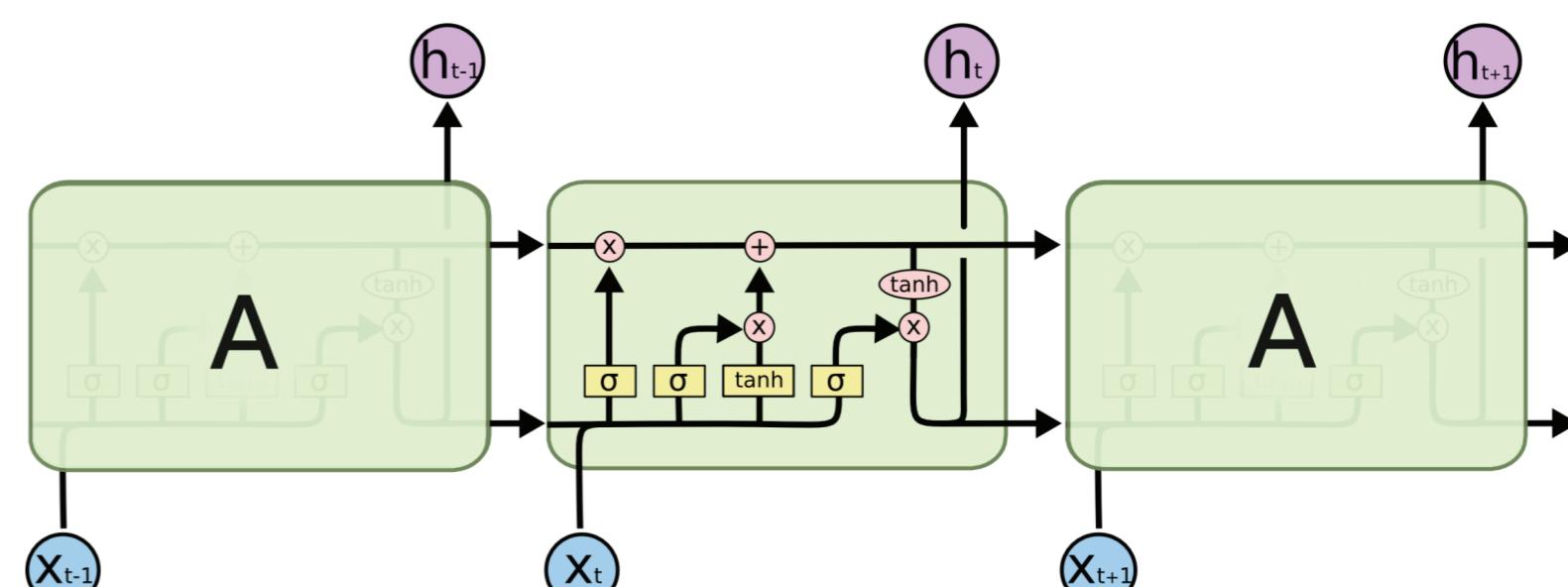
Multilayer perceptron

The first type of neural network used is a simple multilayer perceptron. This is a series of layers that takes input from the previous layer, combines the inputs using an activation function, and then outputs a single value to the next layer.



Long Short-Term Memory Recurrent Neural Networks

These are more complex neural networks, where the recurrent aspect refers to the output of the network being fed back in as an input. Long Short-Term refers to the composition of the recurrent component. Rather than being a single layer, the recurrent component is made up of four layers.



Aims

This work should show that neural networks can learn to act in the same way as a ZIP trader and other algorithms. This could then lead to various research streams including whether neural networks can learn to replicate human trading decisions.