GNR-652 Machine Learning for Remote Sensing

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RNN Based

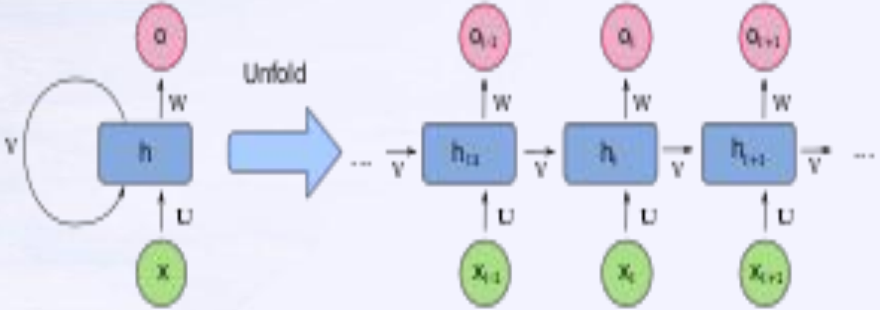
AUTOMATED TRADING

Recurrent Neural Nets

RNNs are the neural nets which uses the memory of its past and current input to predict the next output.

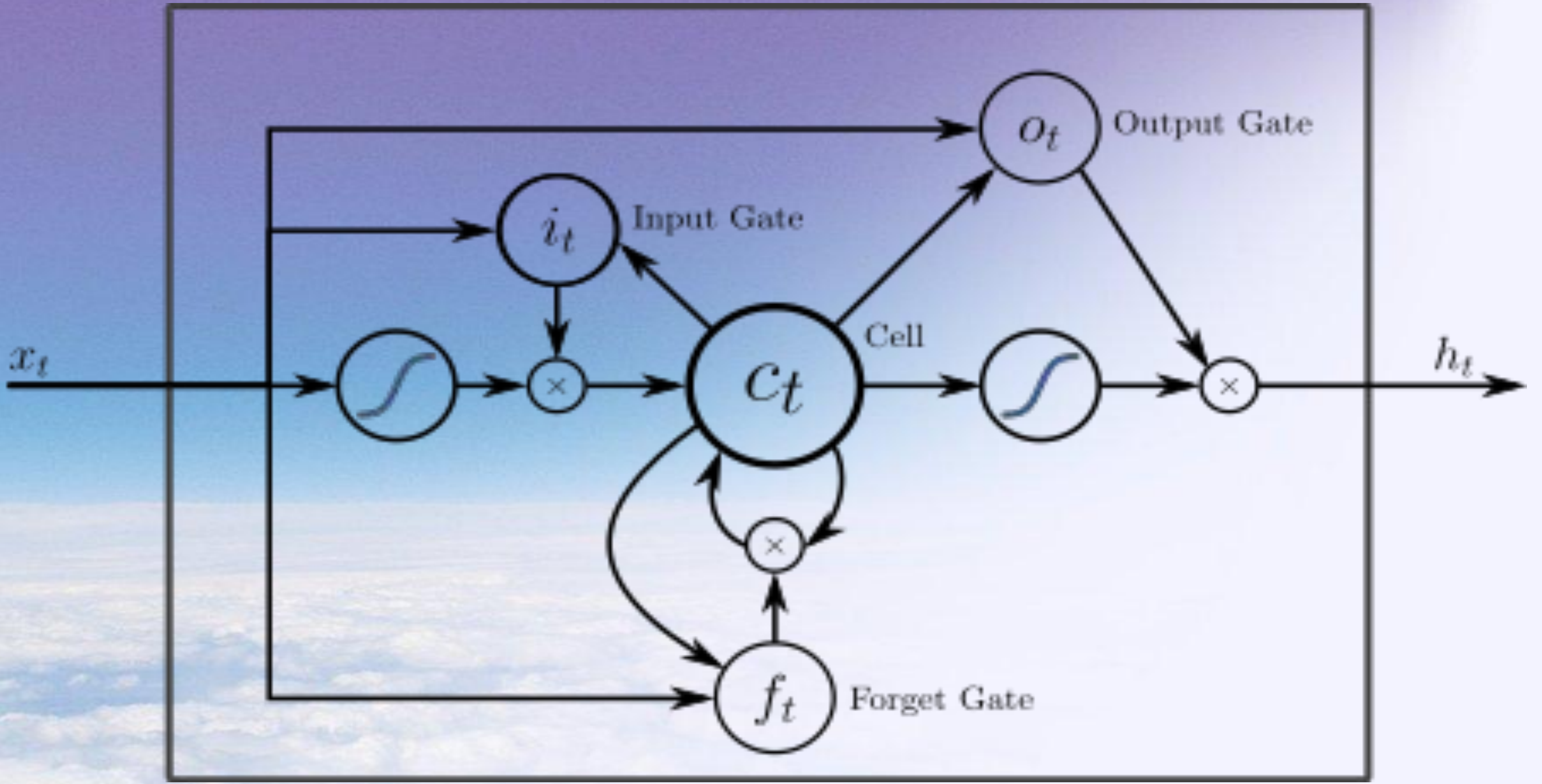
The networks uses its feedback system to process sequence of input. They find their application in speech recognition,

Stock Price Prediction, etc



LSTM(Long Short Term Memory)

- LSTM is the subclass of RNN which overcomes the problem of exploding and vanishing gradient problems encountered in training traditional RNNs.
- LSTM cell consists of input gate, output gate and forget gate. This cell preserves the memory for some time with the gates regulating the flow of information
- LSTM is used for prediction in long sequential Data



LSTM Cell Architecture

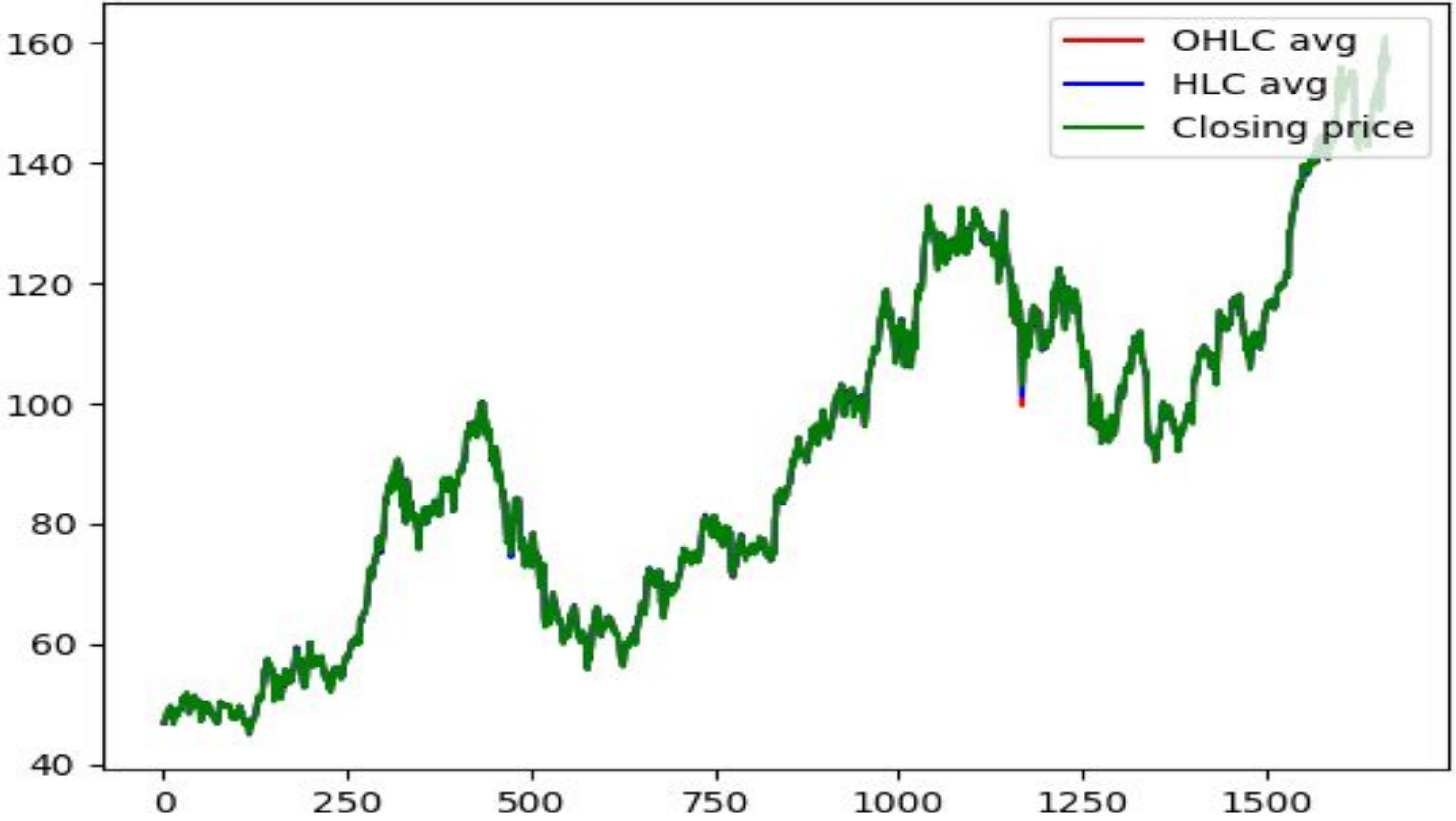
Data Pre-Processing

- The data has been taken from Yahoo Finance website.
- The data initially has five columns.Opening Price(OP),Closing Price(CL),Highest (H)Price and Lowest Price(L),Volume for a day.
- Stock traders mainly use three indicators for prediction: **OHLC average** (average of Open, High, Low and Closing Prices), HLC average (average of High, Low and Closing Prices) and Closing price.
- We will use **OLHC average**.
- Find average and normalized the data in range 0 to 1 (min-max normalization).
- Used Sklearn’s Library MinMaxScaler for normalization

Data Pre-Processing

- Converted into two column time series data, 1st column consisting stock price of time t, and second column of time t+1.Thus data is in feature and output format with one feature column and one output column.Predicts xth day's price to predict prince of x+1th day.
- We can also have more features considering past n days of prices to predict x+1th day.
- Done by just changing the step size in code.
- We used 75% data for Training and 25% for testing.

Pre-processed Data

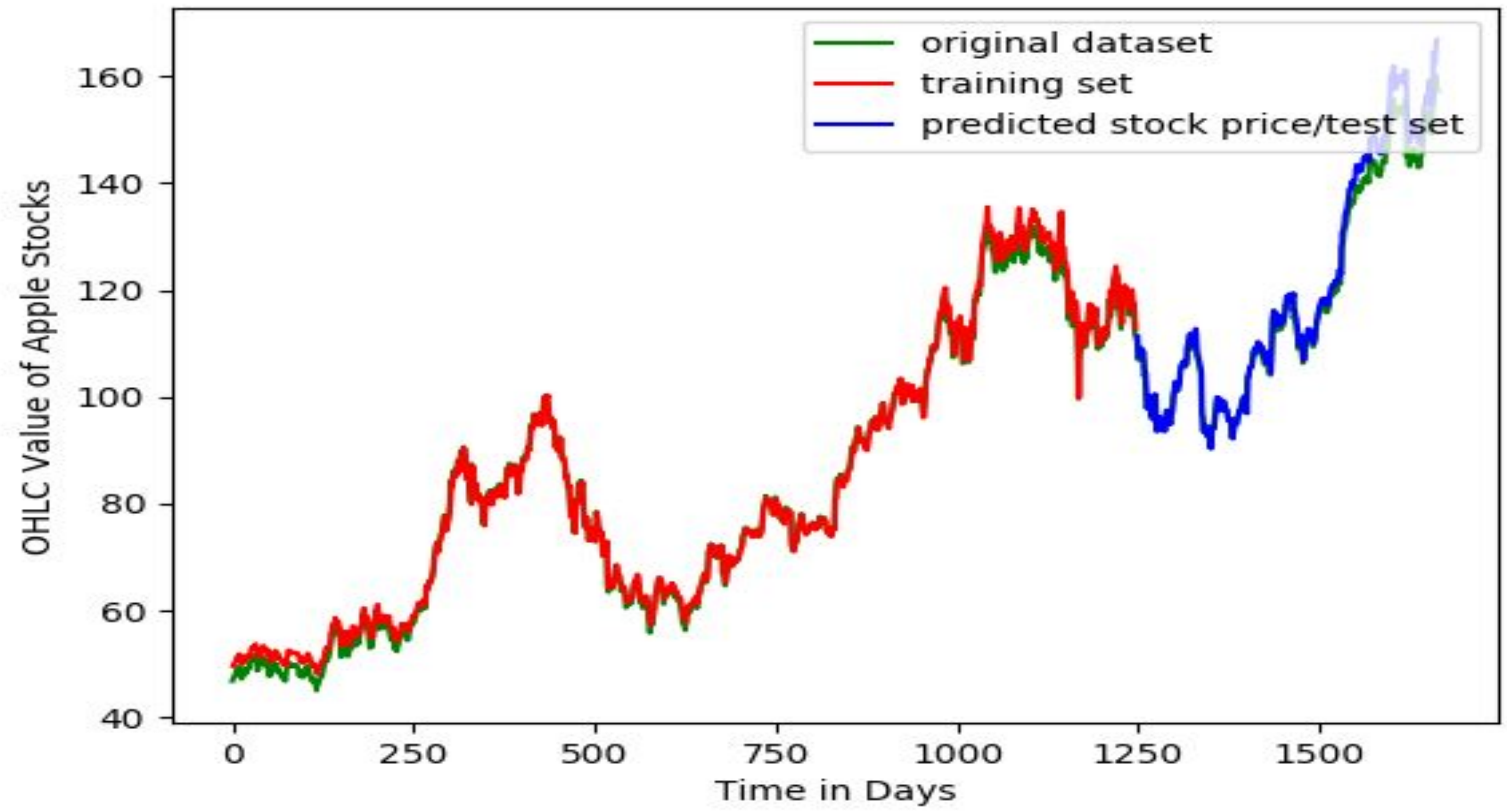


Results:Error Calculation:

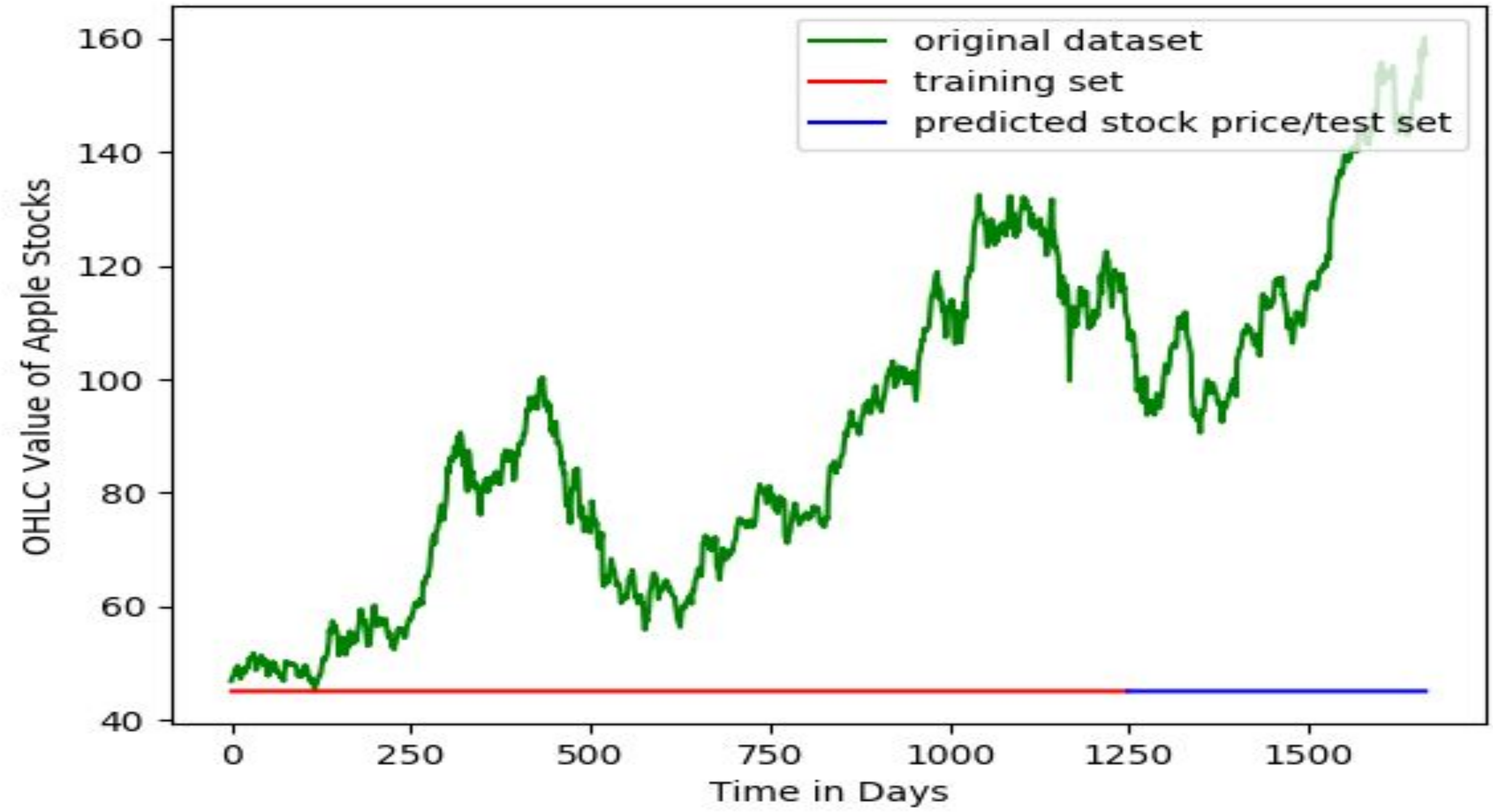
The table shows root mean squared errors obtained on training with different activation functions.

Activation Function	Train	Test	Last day value	Next day value
Linear	1.78	2.99	166.865	176.56
ReLU	44.98	76.2	45	0
tanh	1.39	4.60	145.8561	127.7174

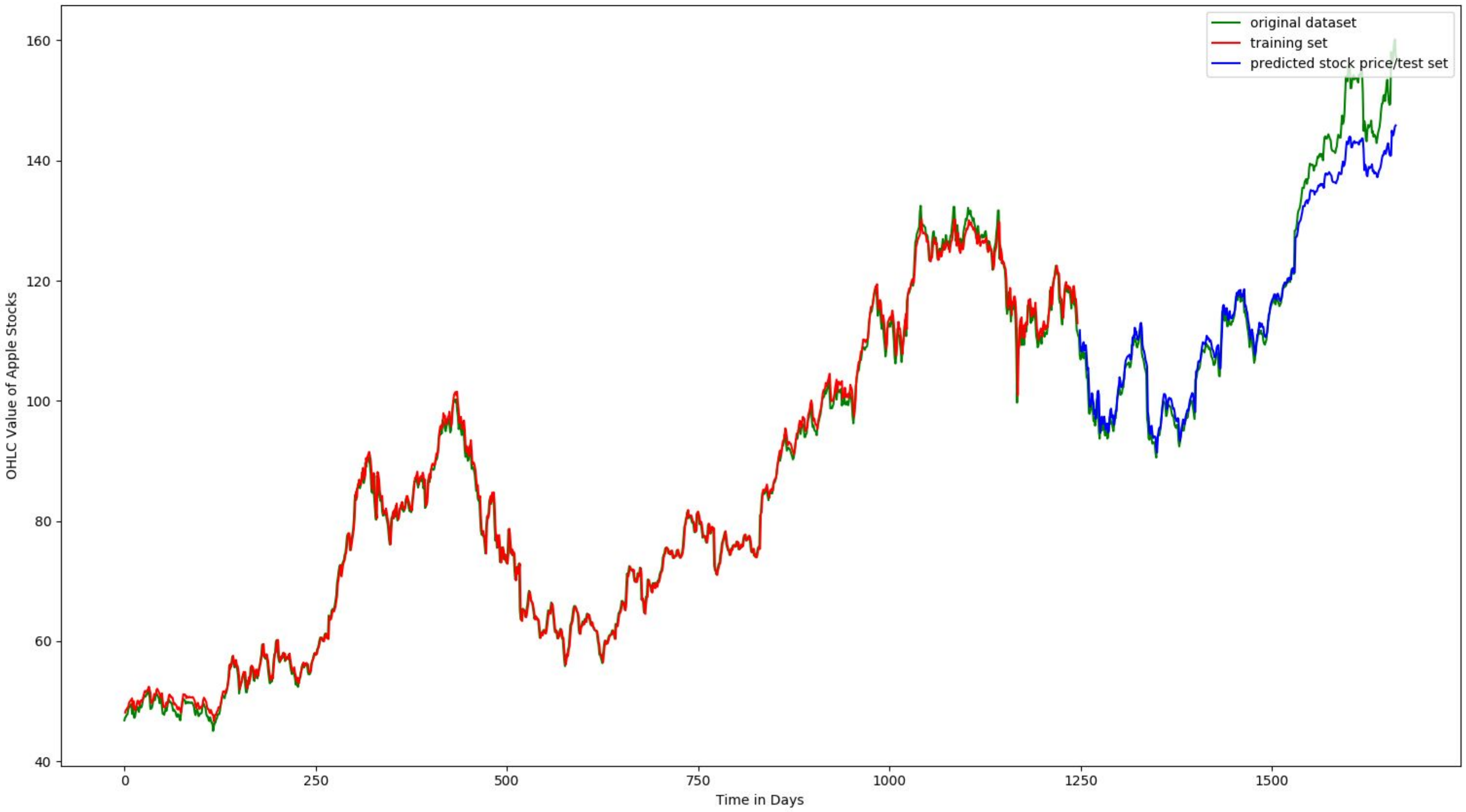
Linear Activation function



ReLU Activation Function



tanh Activation Function



References:

1) https://stackoverflow.com/ (For every running code)
2) https://finance.yahoo.com/quote/AAPL/history/ (Data)
3) https://www.youtube.com/watch?v=BwmddtPFWtA (RNN)
4) https://www.youtube.com/watch?v=9zhrxE5PQgY&t=13s (LSTM)
5) https://www.youtube.com/watch?v=zwqwlR48ztQ&feature=youtu.be (Data PreProcess)
6) https://www.youtube.com/watch?v=zwqwlR48ztQ (An overview)

And a few more...