Time Series Analysis
Stock Prediction

Question 1 | Option 2

LSTM derivatives on day ahead prediction with confidence bounds

- How would you improve and present your results with more time and resources
- Related thinking and planning in a short report

I have used the "NIFTY Auto" stocks for the stock prediction process and that is by using some RNN and statistical models such as

- LSTM **(Long -short-term memory)**
- GRU **(Gated Recurrent Unit)**
- ARIMA **(Autoregressive integrated moving average)**

Dataset:

The closing price time series data of "NIFTY Auto" index from 1st January 2019 to 31st December 2021 which is taken as three separate csv files and then combined into single csv file data for the further processes.

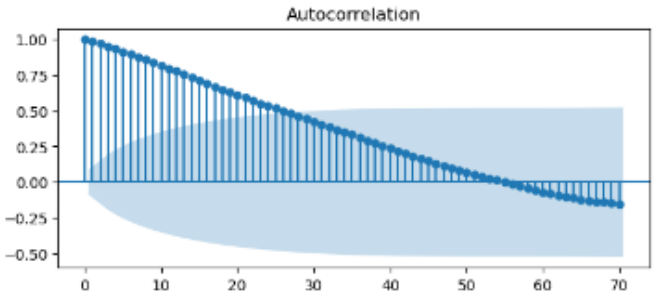
Process:

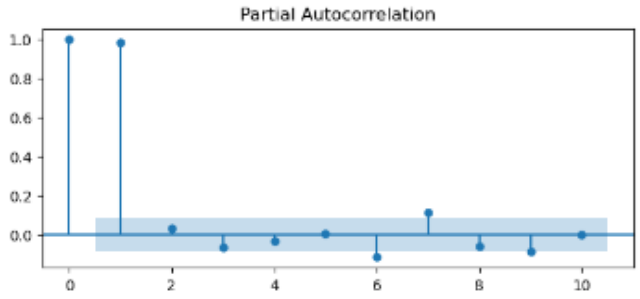
- First, we have to pre-process the data stamp of the dataset and also combine the three different csv file data (which provides stock price for each year from 2019 to 2020) to a single csv file data.
- To perform ACF and PACF test for the data, so that we can confirm is that data is stationary or non-stationary and also about correlation. (Optional)
- Then, to use the LSTM and GRU model we have to get the train and test data, and for that I have done some pre-processing.
- Finally, to improve the prediction results I have used the ARIMA model which shows better results then the RNN models used.

Results and Observations:

Visualization of the Stock data used for training the Models:

ACF & PACF plot:

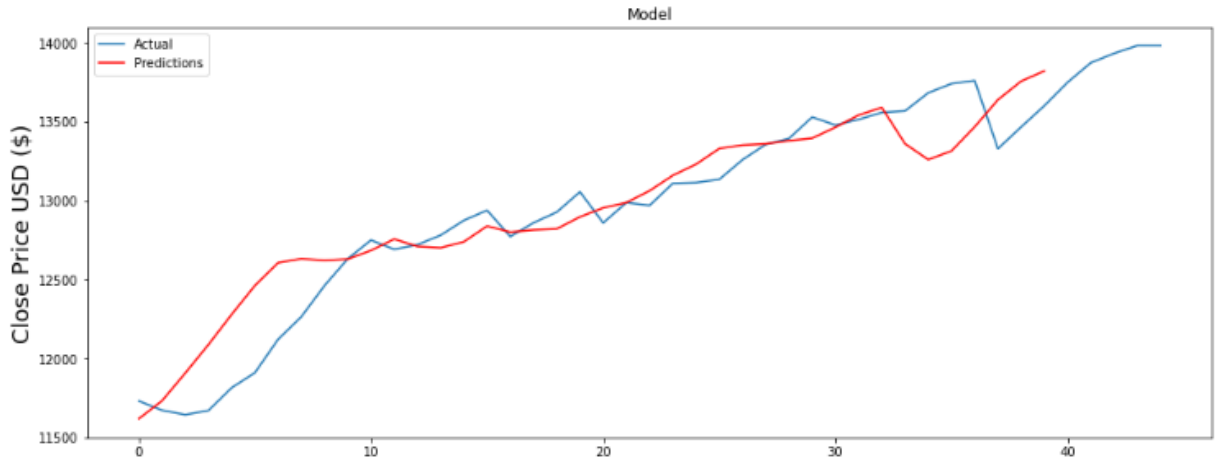




Observation:

- Some significant correlation can be observed here, since it is a deceasing ACF plot.
- Hence the data doesn't come from a random process or white noise.

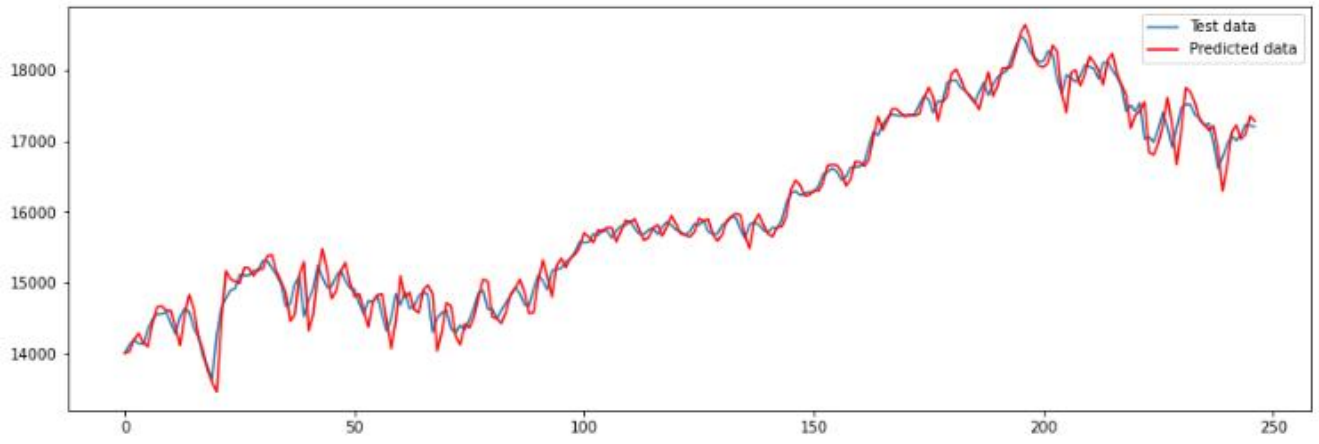
Prediction – LSTM model



Observation:

- The prediction is good, but not so perfect and the RMSE test values is bit higher, so we are using the GRU and ARIMA models for better results
- The GRU model provides the same prediction results, with the reduced amount of the loss calculated during the training process.

Prediction – ARIMA model



Observation:

- The prediction is more perfect than the LSTM and GRU models used
- Also, the RMSE values are much reduced then the previous models
- So, we conclude that ARIMA model is better than the LSTM and GRU models used on here.