Stock Prices Prediction using traditional and machine learning methods

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Abstract

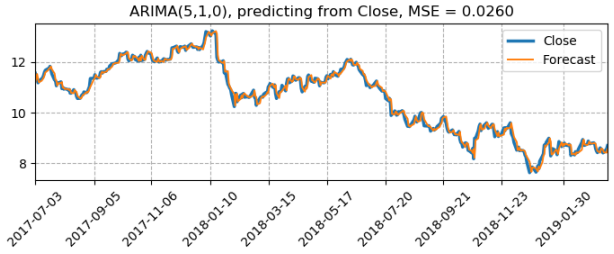
The main objective of this document is to present our results of stock prices prediction. Using autoregressive integrated moving average and Machine Learning model, based on "Stock prediction using deep learning" by Ritika Singh and Shashi Srivastava, consisting of Principal component analysis and DNN, the predictions were made. The results were compared using MSE.

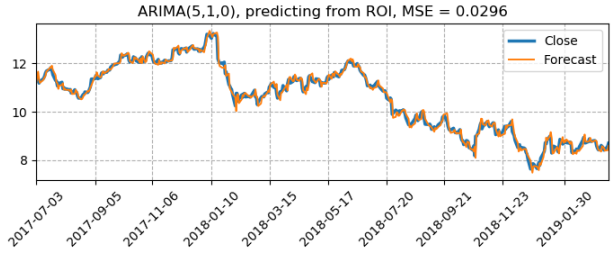
ARIMA

After testing multiple sets of parameters, it was observed that the model works best using $p = 1, d = 0$, $q = 0$, which means that it predicts tomorrow's close price as today's close price.

(p, d, q)	(1, 0, 0)	(1, 1, 0)	(1, 2, 1)	(3, 1, 1)	(1, 2, 3)	(5, 1, 0)	(5, 1, 1)
MSE	0.0181	0.0185	0.0185	0.0187	0.0185	0.0187	0.0187

Hence, with the inclination towards ML model, the ARIMA with dubious parameters was finished with results as follows.





ML model

Starting with data processing, with accordance to reference paper, multiple economic parameters were calculated based solely on Close price, Open price, High price, Low price. In the next step, the PCA was used in order to extract the most important parts of the data. Then, the results were the input of DNN. The DNN used in the project predicts from 20 days window, allowing for randomization of the order of dates during training, to avoid overfitting.

Results

The ML model was tested with different hyperparameters such as: number of epochs ranging from 10 to 1000, predicting from ROI and closing price, number of hidden layers from 2 to x and number of cells in each of them from 200 to 500.
In conclusion the ML model was comparable to ARIMA and even surpassed it in some cases.