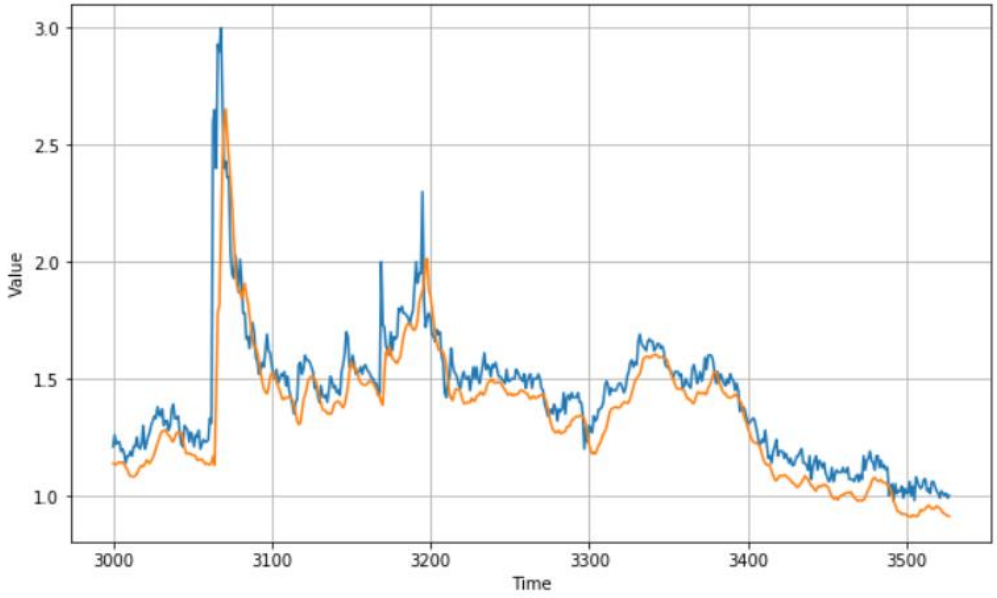
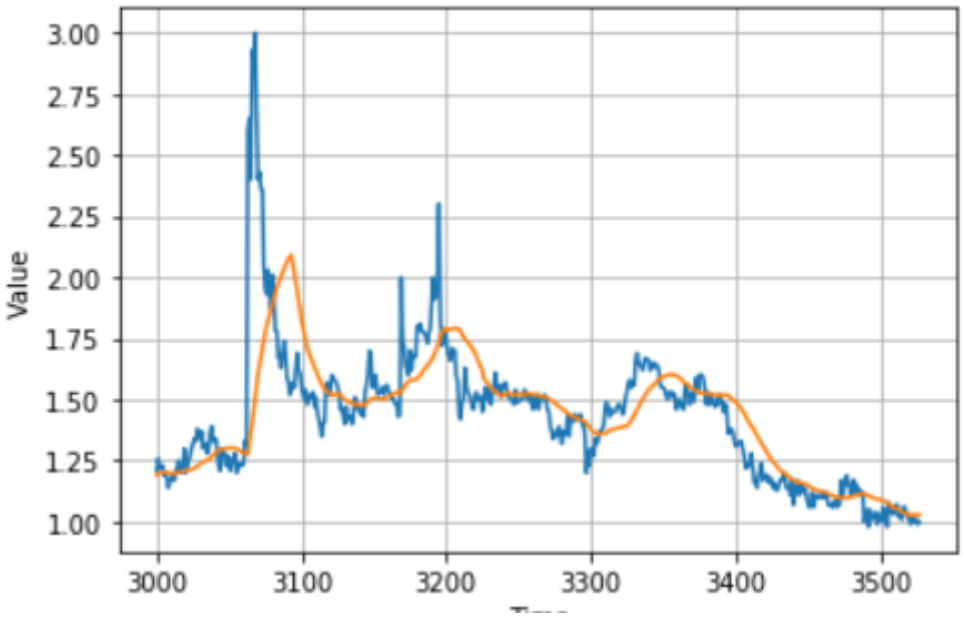
In this project, I took a historic data of FORD company from Yahoo. The data belongs to 2005-2019 years interval. It has 3528 samples. The data contains 6 columns: data, and 5 stock types. I decided to choose “open” column to work. The data was splitted into train and test set, 3000 and 528 respectively. The first model consists of 1 convolution layer, 2 lstm layers and 3 dense layers. The activation for dense layers was relu, and the activation function for model compile was sgd with learning rate `1e-5` and momentum 0.9. I run my model for 30 epochs. The graph below is for real data with blue color and predicted data with orange color. Usually we call this model RNN model.

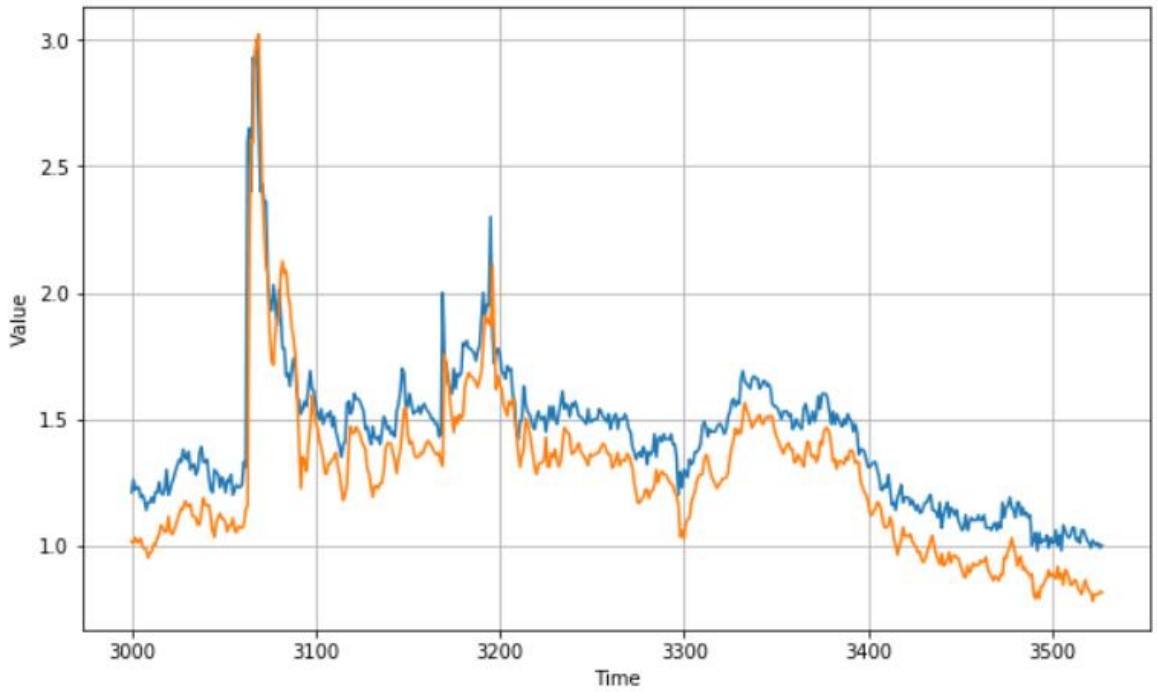


As you can seen, my first model predicts well and it has almost same result with real data. Now let’s compare our real data with predictad values done by moving average. As usual, real data in blue color, predicted data in orange color.



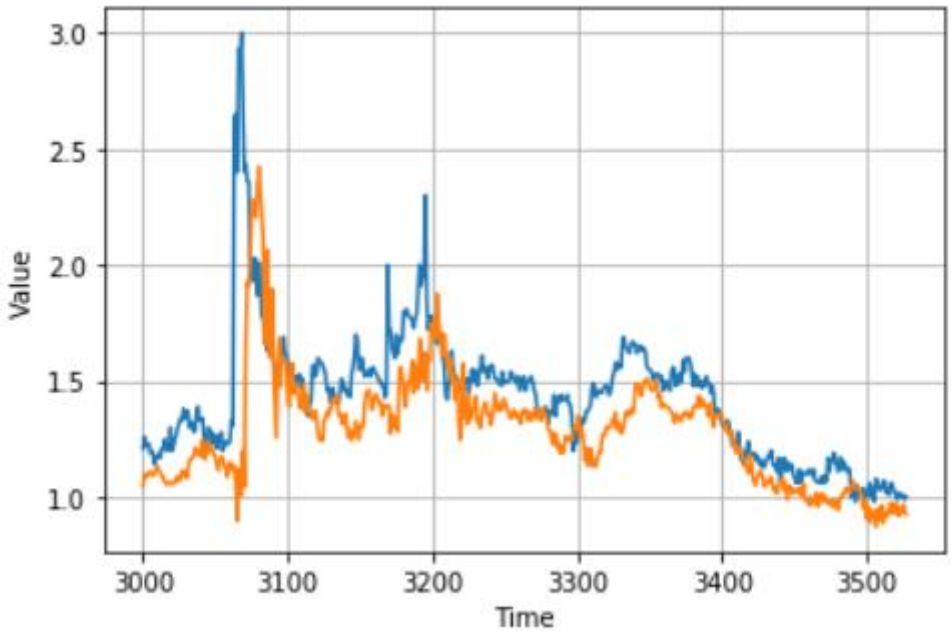
But after looking at the graph, you can see that moving average brings poor result. So, it is not necessary to apply this model if high accuracy is expected.

The next model is the sequence of Bidirectional Lstm layers with 64 and 32 neurons inside and dense layer. The **mae** for this model after 50 epohcs runned was **0.17.** Let’s compare behavior of this model with real data. Again, blue for Real data, orange for predicted data.



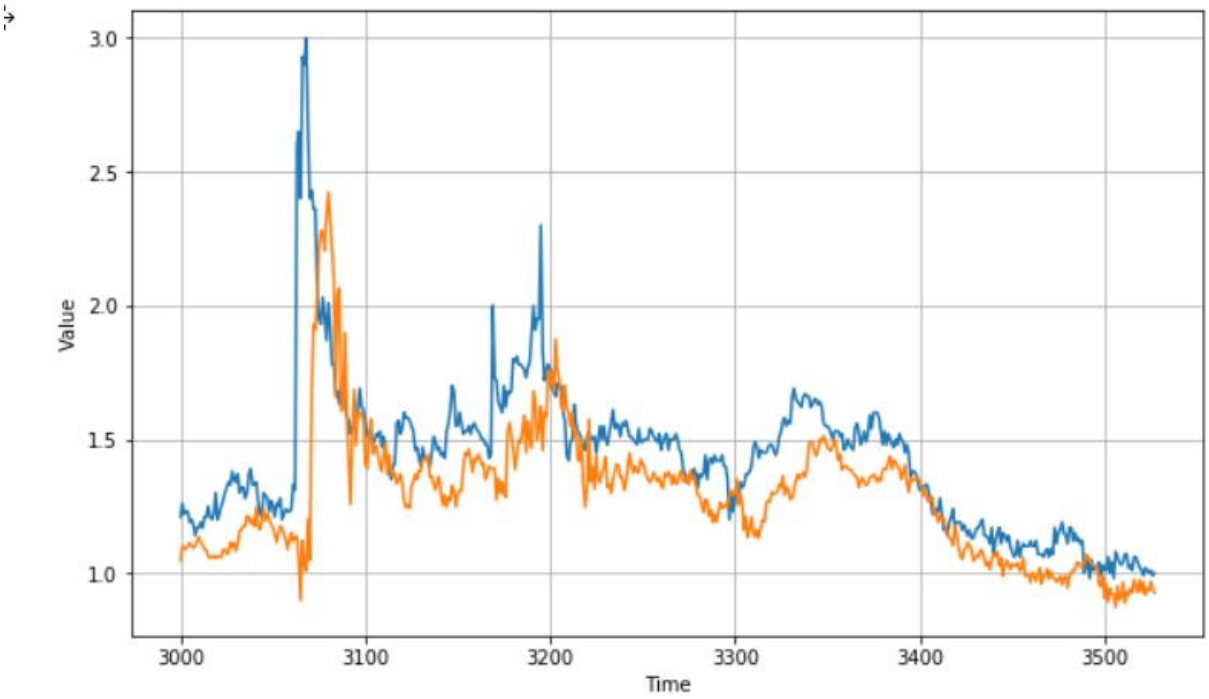
According to graph, the model works not bad. It has almost same values readl data.

Then I tried to run model with several dense layers and it resulted in **0.29 mae** after 50epochs. Let's see, what can be observed from the plot if we compare it with real data.



It can be noticed from graph that model brings always smaller value than real data. But overall, it is in the same trend as real data is.

The next model is constructed with simple rnn layers with 40 neurons and 1 dense layer. Optimizer as before sgd with learning rate 5e-5, momentum 0.9. After running it for 50 epochs, we reached a **mae of 0.68.** Here is the graph representation of the model compared to real data:



It can be noticed that the model works well, because the tendency is same, but it slightly shifted to right. However, if we compare all models with their mean absolute errors, it will be easily noticed which model is best which is worst. We can notice that three last models behave almost same, since their mae is almost same. But the most accurate model with less mae is the second model. According to table it had mae of `0.09923244`.

The models' construction	Mean absolute errors
Moving average	`0.10960858585858589`
CONV1D+LSTM+LSTM+DENSE+DENSE+DENSE	`0.09923244`
Lambda+Bidirectional X 2 +Dense+Lambda	`0.1645855`
Dense+Dense+Dense	`0.16349578`
Lambda+Simple RNN x2+Dense +Lambda	`0.16349578`