Q4 Report: Stock Prediction

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1. Dataset

Download dataset from Yahoo! Finance:

- AAPL: https://finance.yahoo.com/quote/ADAP/history?p=ADAP
- PG: https://finance.yahoo.com/quote/PG/history?p=PG
- GM: https://finance.yahoo.com/quote/GM/history?p=GM

2. Experiment

Here I use LSTM (Long Short-Term Memory) model to predict the future stock price. The LSTM cell structure of the model is shown below:

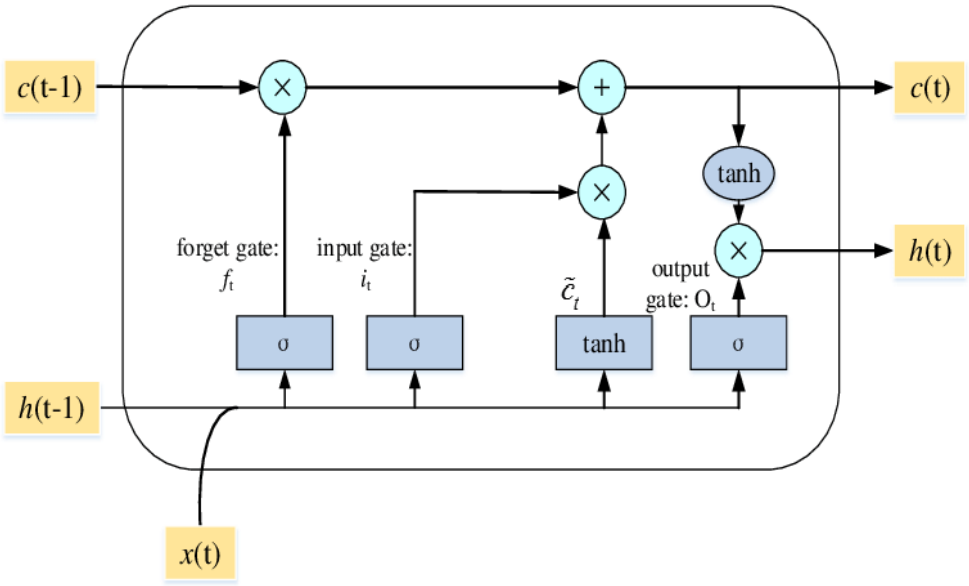

Figure. The LSTM cell structure

The detailed settings are as follows:

```
number of layers = 1
the size of layer = 128
dropout rate = 0.8
learning rate = 1e-2
training epochs = 300
```

Because I set the number of `layers = 1`, the model only has a LSTM cell

```
rnn_cells = tf.nn.rnn_cell.MultiRNNCell(
           [lstm_cell(size_layer) for _ in range(num_layers)],
           state_is_tuple = False,
       )
```

Then a dropout layer and a hidden layer are also defined

```
drop = tf.contrib.rnn.DropoutWrapper(
           rnn_cells, output_keep_prob = forget_bias
       )
       self.hidden_layer = tf.placeholder(
           tf.float32, (None, num_layers * 2 * size_layer)
       )
```

Lastly, I define the loss function and use Adam as the optimizer

```
self.optimizer = tf.train.AdamOptimizer(learning_rate).minimize(
           self.cost
```

I predict the stock closing price in the next 30 days. You can see the whole forecasting results in the Q4.ipynb, here I only show the prediction results on June 2, 2020.

Company	Stock closing price
AAPL	313.3019549021752
PG	115.84059501552453
GM	25.169791590906147

Table. The stock prediction results on June 2, 2020

Moreover, I also visualize the stock price from 2019-05-30 to 2020-06-28. The black line is the true trend and the blue line is forecasted by LSTM model. The predictions after May 30 are based on the previous stock trend data.

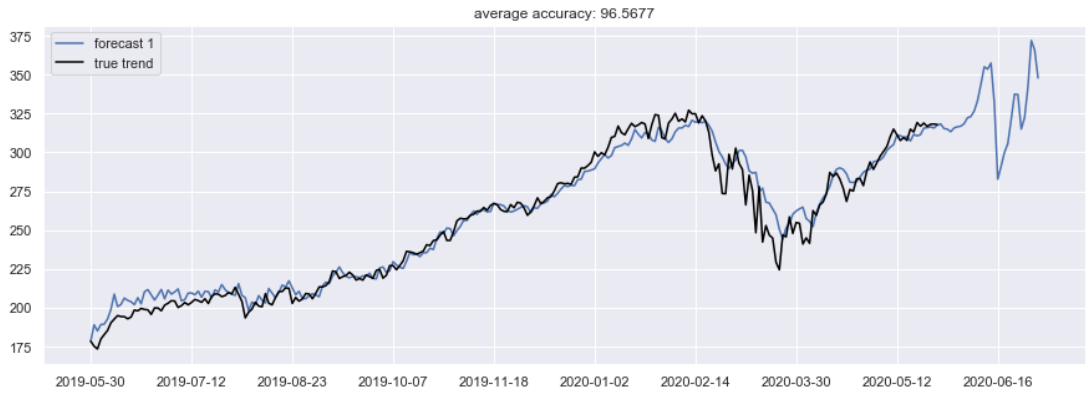

Figure. The curve of the daily closing price of AAPL from 2019-05-30 to 2020-06-28

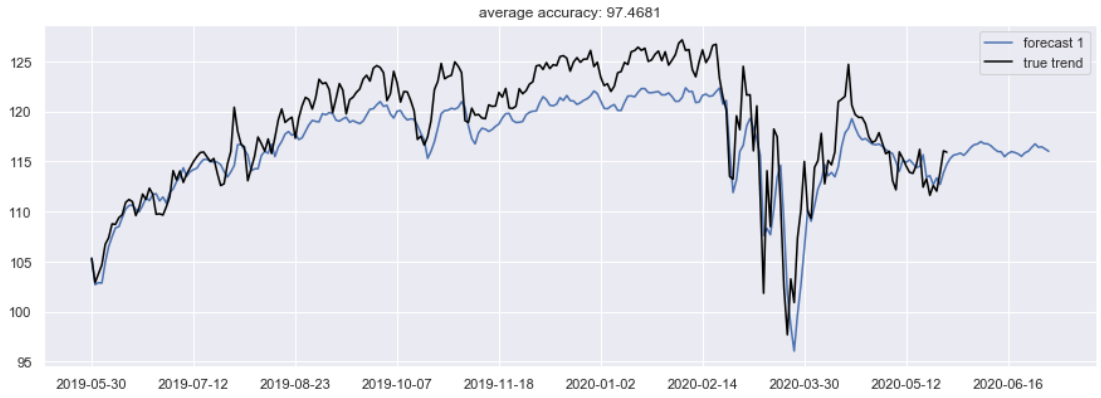

Figure. The curve of the daily closing price of PG from 2019-05-30 to 2020-06-28

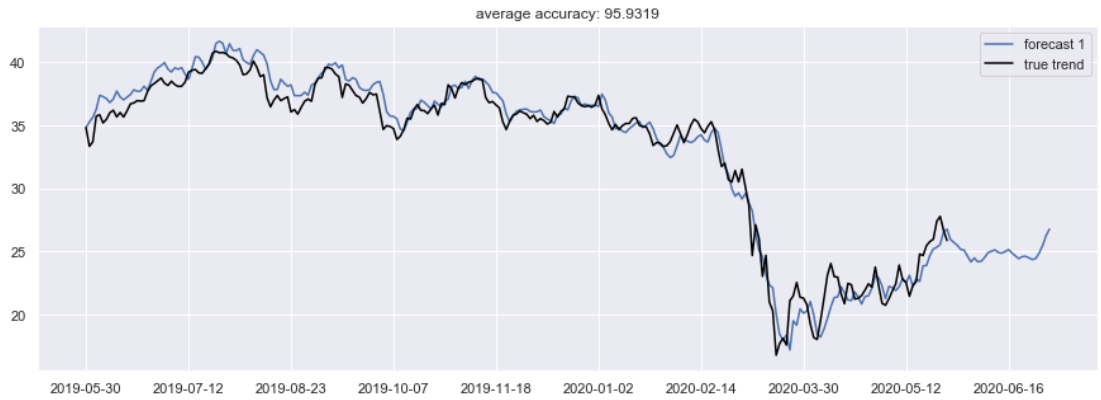

Figure. The curve of the daily closing price of GM from 2019-05-30 to 2020-06-28

Reference

Code Reference on Github, using LSTM model to predict stock price.
https://github.com/huseinzol05/Stock-Prediction-Models