

Stock Price Analysis and Forecasting

Shuntao Chen
Yiling Kang

Background

- Then investor would like to know during the past, how the stock price changed, what is the largest inflation and ideally how the price will go in the future.
- Also for multiple stocks, investor would be interested in which stock performs the best in the past, and which one should I invest in order to maximize the profit.



Use Case

- For example, the user may want to know how the TESLA changed from 2020 to present, and how it behaves comparing with other stocks.
- The user may also be interested in how the price will change tomorrow, this is important for him/her to decide whether to buy the stock.
- For multiple stocks, which one can maximize the profit.
- We can not know in advance which stock and time the user want, and it is unrealistic to store all the data locally.
- We will need an API to read data based on the user's request.

Python Libraries

- pandas
- numpy
- matplotlib
- seaborn
- datetime: package that deal with the time
- pandas_datareader: package for reading data
- plotly: package for visualization

pandas_datareader

- We allow user to specify the stock symbol and time range.
- We can read data based on user request.
- pandas_datareader package can read stock data from different sources, here we choose “Yahoo Finance”
- In this way, we do not need to store the data locally.
- We can build a tool for user to make analysis and do prediction.

```
from pandas_datareader.data import DataReader
```

```
DataReader("Meta", "yahoo", "2022-01-01", "2022-11-30")
```

	High	Low	Open	Close	Volume	Adj Close
Date						
2022-01-03	341.079987	337.190002	338.299988	338.540009	14537900	338.540009
2022-01-04	343.089996	331.869995	339.950012	336.529999	15998000	336.529999
2022-01-05	335.760010	323.839996	333.019989	324.170013	20564500	324.170013
2022-01-06	339.170013	322.720001	322.820007	332.459991	27962800	332.459991
2022-01-07	337.000000	328.880005	332.739990	331.790009	14722000	331.790009
...
2022-11-23	112.669998	110.730003	111.720001	112.239998	21343100	112.239998
2022-11-25	112.730003	111.019997	111.300003	111.410004	12007600	111.410004
2022-11-28	112.040001	108.379997	110.779999	108.779999	23309400	108.779999
2022-11-29	110.940002	108.540001	109.540001	109.459999	23899200	109.459999
2022-11-30	118.160004	109.379997	109.510002	118.099998	43274700	118.099998

plotly

- Advanced package which can easily produce professional financial plots
- We can add some interactive icons to the plot
- We can zoom in and zoom out the plot to see specific part
- We can see the detail of data by putting mouse on that point
- We can hide and unhide some lines by click the label of legend

Stock Price of Meta, AMZN



Stock Price of Meta, AMZN



Candlestick Charts of Meta

1m 3m 6m 1y all



Candlestick Charts of Meta

1m 3m 6m 1y all



ML Model

- TBATS: a model combined the box-cox, trend, multi-seasonality and ARIMA residual. Performed not bad for the first few steps.
- Geometric Brownian Motion: (On going)
- What we can get from the model: tomorrow's price and confidence interval.
- How user can use this: buy the stock if the predicted value is an increase.
- How to determine the model accuracy: use this strategy for 30 days and see how much profit we can gain.