

Stock Price Analysis and Forecasting

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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 wants, 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:

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



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.