# Stock Price Analysis and Forecasting Tool

Shuntao Chen,Yiling Kang

## 1) Background and Motivation.

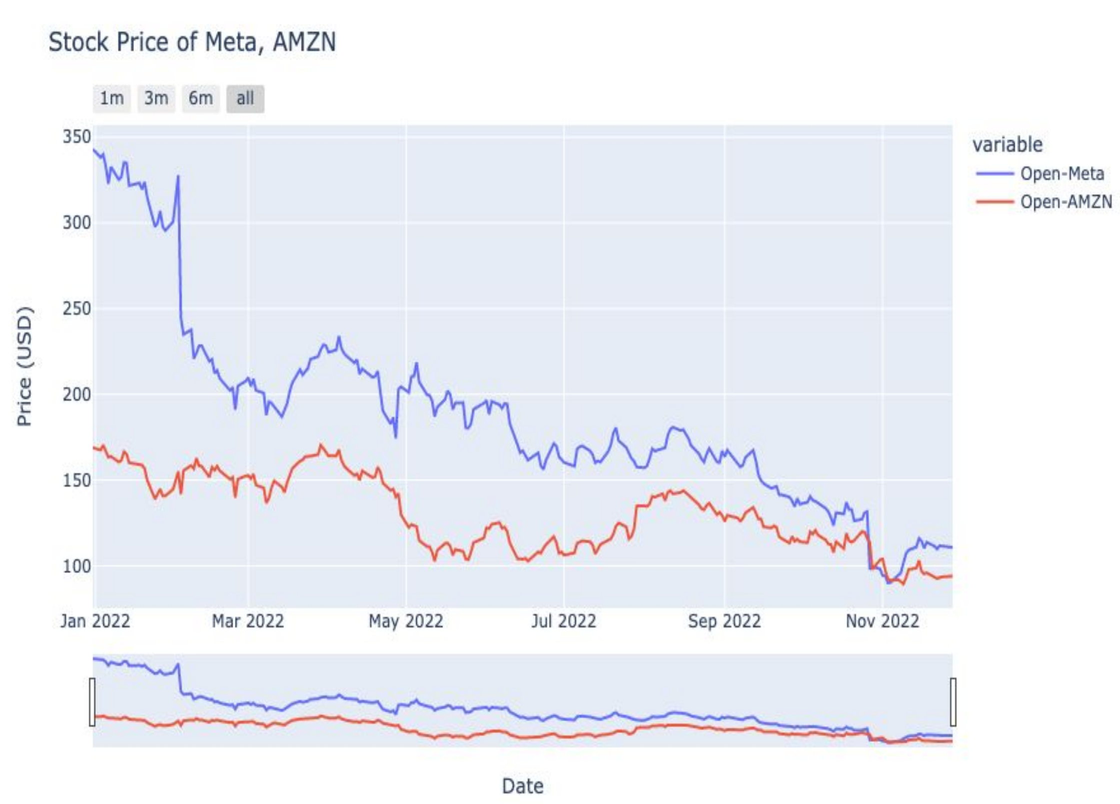
- **Use case:** Investor would like to know how the give stock behaves in the past, how the price will change tomorrow. Based on thest informa, what kind of invest strategy he/she should take to maximize the profit or minimize the risk.
- **Structure**:
    1. Read the stock price data based on user's request.
    2. Perform data analysis and visualizations.
    3. Use machine learning model to forecast the future price.
    4. Based on the predicted prices, derive some invest strategy.

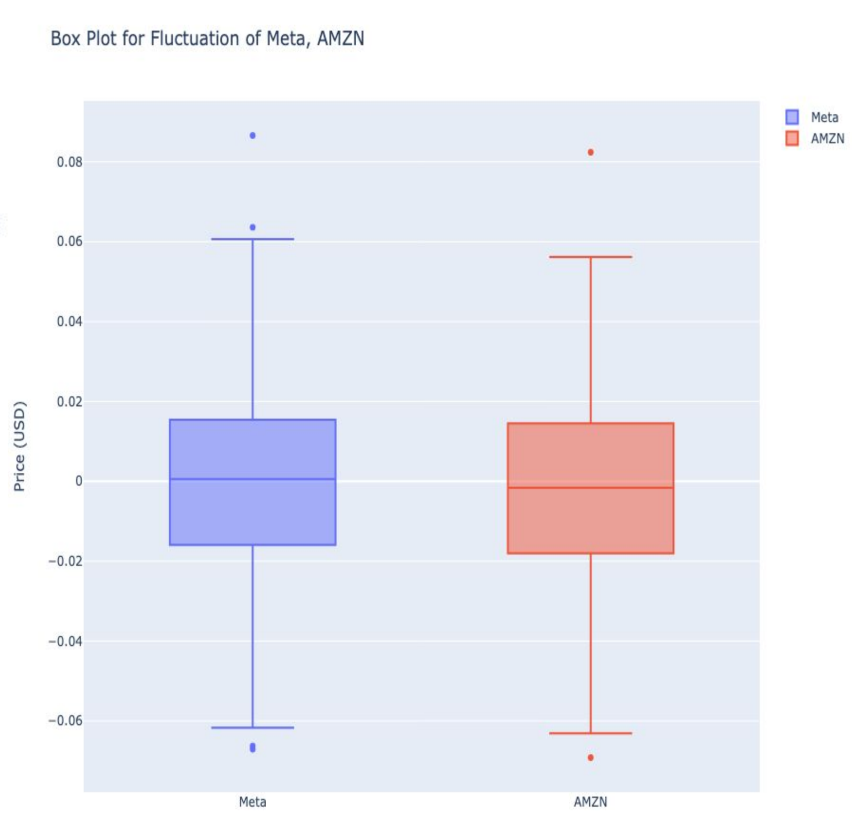
## 2) Selected Python Packages

- **pandas_datareader:** a package that can read stock price data through Yahoo Finance based on user's request.
- **plotly:** an advanced package which can produce professional financial plots.
- **sktimes:** contains tbats time series model which we used to forecast the future prices.

## 3) Visualization

- **Input values:** stock symbols and time range.
- Plot for the daily price in the given range
- Box-plot for the daily fluctuations.




- Candle-plot for the stocks.


## 4) Machine Learning Forecasting

- The machine learning model we choose is **TBATS**, a time series model combines: box-cox transformation, trend, multi-seasonality,
- **TBATS** model works pretty good at the first step forecast, so we only use it to predict tomorrow's stock price.
- Our algorithm for forecasting is:
    1. Train model until day **x.**
    2. Predict the stock price and the prediction interval for next market open day, say **x+1**.
    3. Update the model with the price on day **x+1**.
    4. Redo step 2.



## 3) Invest Strategy

- We predict the close values, and compare it with tomorrow's open value. We will build the strategy based on predicted profit margin.
- Unweighted strategy: invest all money into the stock with largest positive predicted profit margin.
    - ➢ Good when variation of predicted profit margins is large.
- Weighted strategy: invest all stocks with positive predicted profit margin, use predicted profit margin as weight.
    - ➢ Good when variation for predicted profit margin is small.