Project Report for Berkeley Extension Data Analytics Bootcamp

Team :D

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Team members:

Justin Agogbua

Ran Bi

Shuai Li

1. Executive summary
   1. Purpose of this report

This report serves as the report for Project Two, to fulfill the requirement of Berkeley Extension Data Analytics Boot Camp.

* 1. Aims and objectives

Stock market is irrational and is affected by tremendous number of factors. We want to build an interactive panel for user to explore the stock price and trading volume versus time, interest rate and earning calls. We also want the users to be able to compare different stocks intuitively.

Upon completion of the interactive panel, we were able to explore:

* How stocks perform since the IPO
* How earning calls affect the stock price
* How interest rate affects the stock price

The interactive stock exploration panel was deployed to Heroku for accessibility:

<https://desolate-bastion-97991.herokuapp.com/>

1. Data source and data handling

Data are from three sources:

1). Stock data is from QUANDL API

2). Earning data is from IEX API

3). Interest rate data is from csv file.

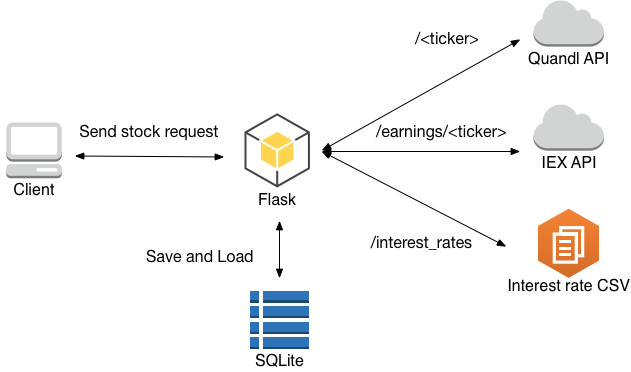
Upon user input of the stock ticker, JavaScript posts request to three routes defined by Flask. In each Flask route, data is pulled from API or csv file, saved in sql.lite and returned in json format.

Flask routes:

/<ticker> displays daily stock data in json format.

/earnings/<ticker> displays earnings data for requested stock in json format.

/interest/rates displays the federal reserve interest rate for past ten years in json format.



1. New JavaScript library

Highcharts.JS is used as our new JavaScript library. Highcharts is a JavaScript based charting library. It is a meant to enhance web applications by adding interactive charting capability. Highcharts can provides a wide variety of charts, including line charts, spline charts, area charts, bar charts, pie charts, etc.

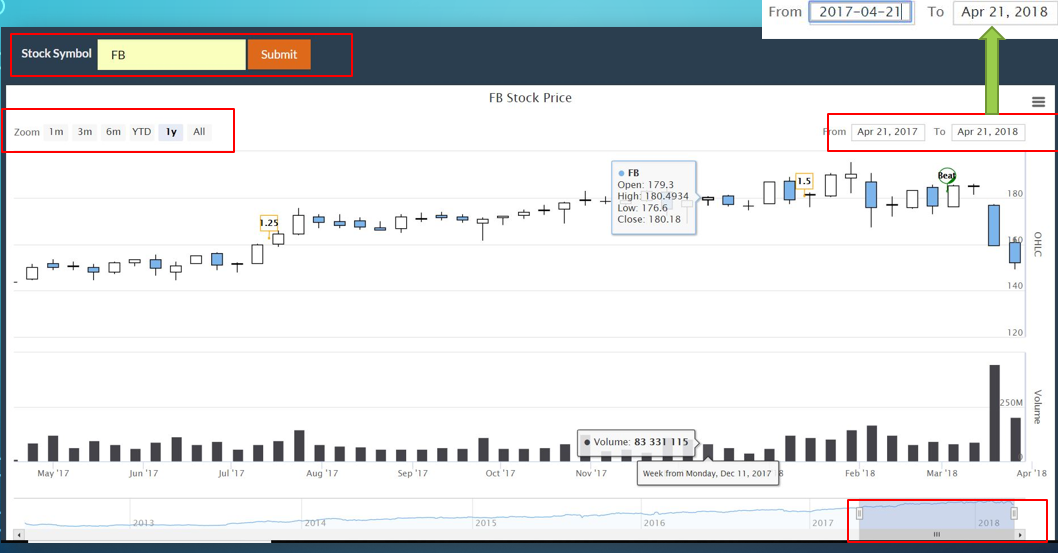
![A close up of electronics

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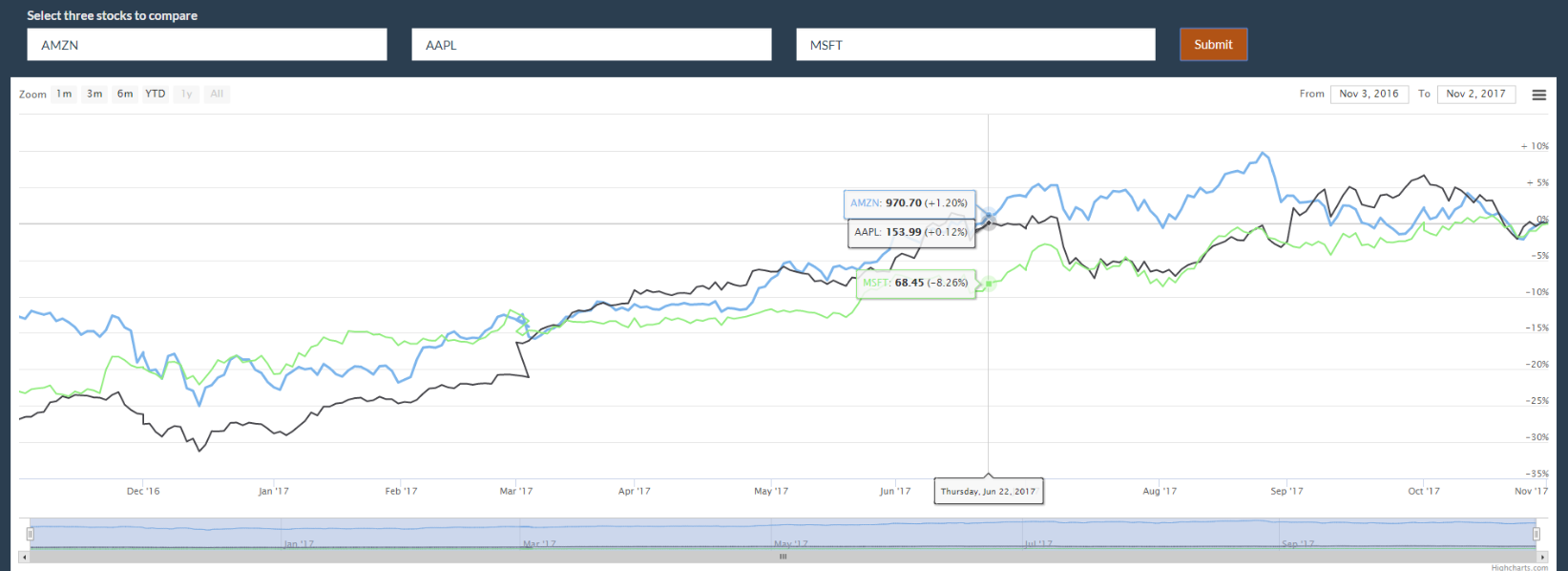
1. Interactive panel

All the parts highlighted by the red box are interactive parts of the panel. User needs to input a stock ticker and submit to start, and once the chart is shown, there are three ways user can change the time to explore the stock. Users can choose the time frame from top left by clicking on the buttons, input date range in numbers in the top right box, or drag the bar on the x-axis.

Upon the mouse hover on the plot, it shows the stock ticker, the day open, high, low and close stock price.



The second part of panel works the same way, user can input up to three stocks in interest and click on “Submit” button. Upon the chart is plotted, there are up to three ways for uses to change the time to the time in interest. The hover-on of the mouse shows the stock ticker, stock price and the stock price percent change.



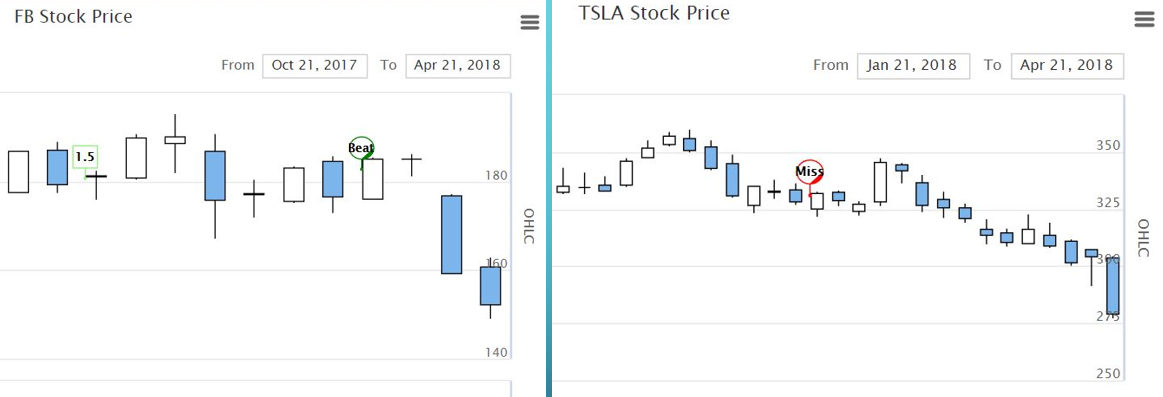
1. Stock exploration

Upon the completion of the interactive stock exploration panel, we did some exploration and had some observations:

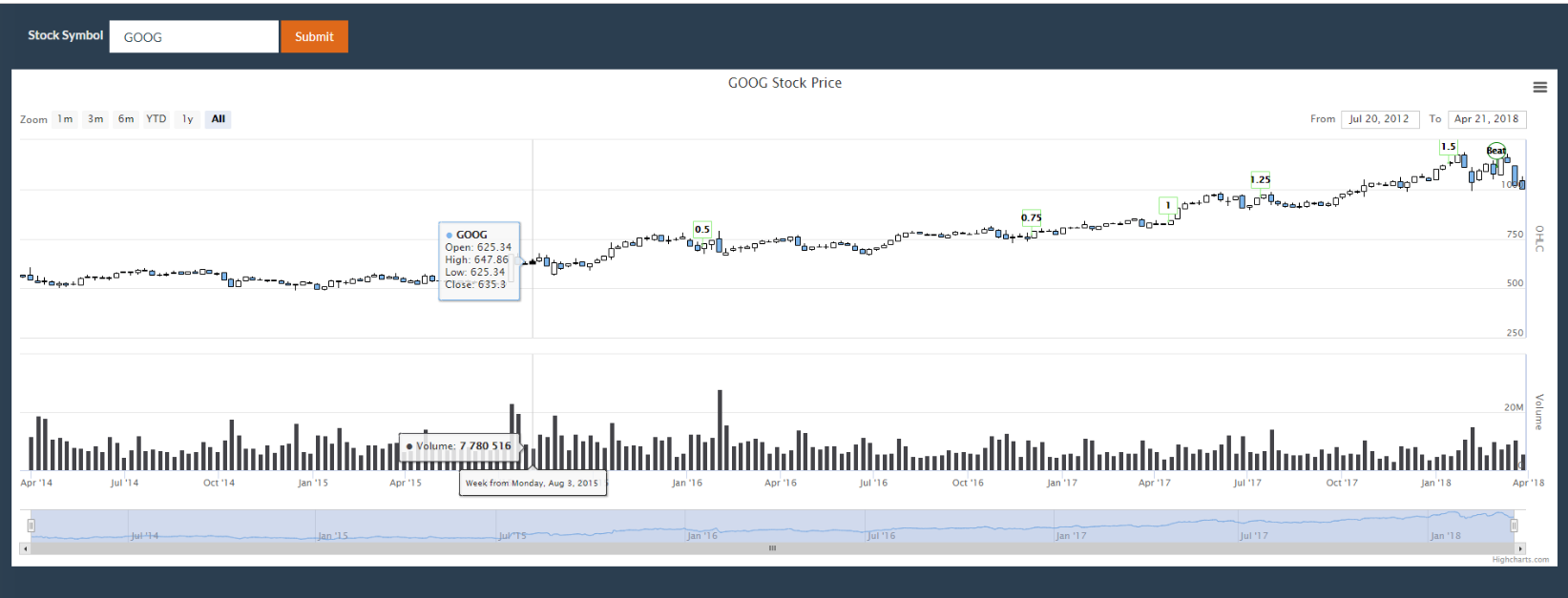
1. Earning call does affect stock price in short term. In the exploration panel, if the earning call beats expectation, it’s shown in green, and the missed earning call is shown in red.

As shown in the left plot below, Facebook had its earning call beat the expectation, but it announced lower expectation in the following quarters, thus the stock price reacted accordingly.

In the right plot below, the Tesla stock was in a downward trend throughout the following quarter due to earning call missed.

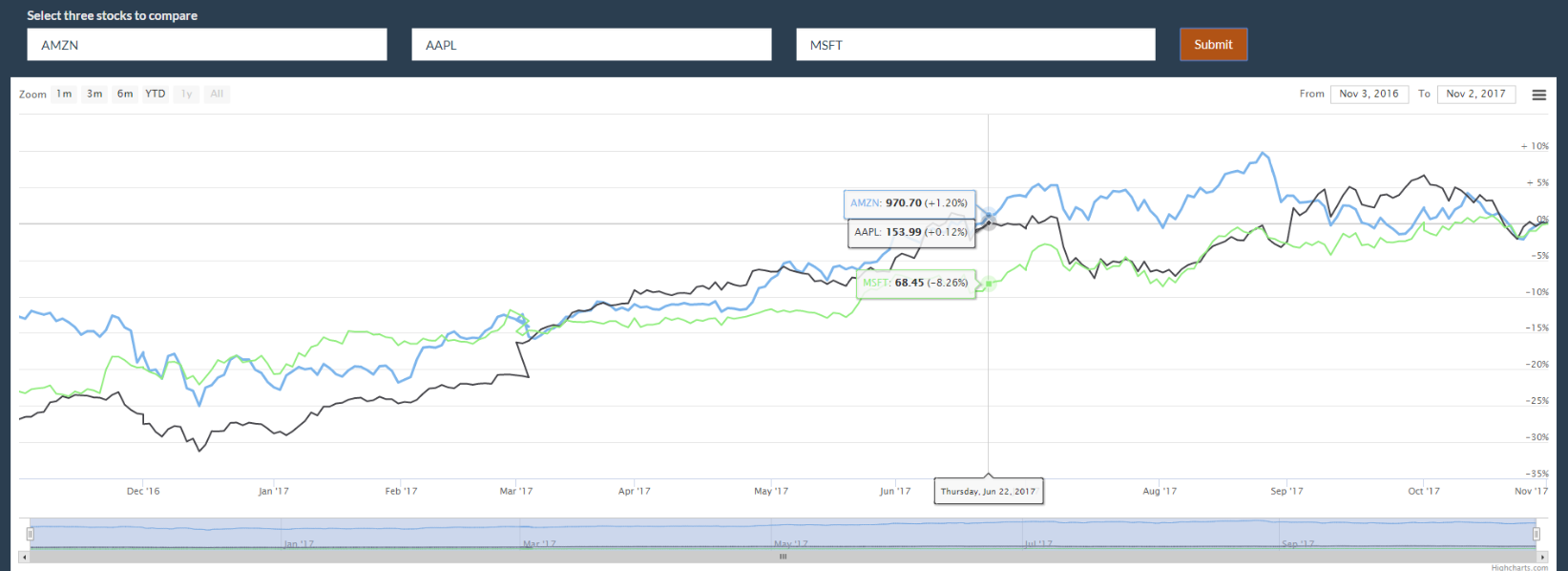


2). Interest rate was found to be a good indicator of the economy. Below plot shows Google’s stock from 2012 to 2018. It can be seen that the interest rate was flat at 0.25 before 2016, with the stock price almost flat in the same time frame. When stock price starts to climb in 2015, which is a good reflection of the US economy boom, Federal Reserve started to add interest rate, and more and more intensively since 2018.



3). The interactive panel also allowed us to compare the performance of up to three stocks in the same time frame. As shown below, it’s a very good indication of how a stock performs comparing to other company’s in the same industry. The comparison among Intel, AMD and NVidia provides investors with an intuitive insights.





1. Limitations and Recommendations

Free stock data is only till April 2018, but free earnings data only covers one year from now. As a result, earning-stock price correlation is only shown for 1 quarter in the current panel.

Federal reserve increases interest rate since 2017, and the increase gets more intensive in the second half of 2018. However, stock plots only shows up to Apr, 2018 due to the free data limitation. As a result, the interest rate’s dramatic impact on stock in recent weeks are not reflected in the current plot either. If up-to-date stock data can be obtained, the interest rate’s impact will be more clearly shown.