PROJECT TITLE :

ANALYSIS ON STOCK MARKET

TEAM MEMBERS :

JUSTIN PATEL 0707046

SAI AJAY MAJETI 0718705

GROUP NUMBER :

16

INSTRUCTOR NAME :

FADI ALZHOURI

INTRODUCTION

Investment is important to let your money work for you while you are sleeping. There are a lot of options available to put your money and gain some growth on your investment. Whereas a stock market has been considered a very popular fashion for investment. Many people think that it is really hard to understand the stock market. Yes, that is true that it is hard but with proper knowledge and decent experience it becomes easy to play with. One should not forget the risk tolerance involved in investing with the stock market, however, it is safe to say that at least one should be aware of what is known risk rather than proceeding with an unknown risk. So in order to make the right decisions while investing in the stock market, there are two main elements which should be taken into consideration, be it 1) Fundamental Analysis and 2) Technical Analysis.

The first part mainly deals with the balance sheets and profit-loss results of a particular company and how the company has been doing financially so far. Moreover, we can see the percentages of return a particular company has given. If we are planning to invest for the long-term then we can have a look at the comparisons of yearly returns of different companies. Whereas, for the short-term investment, we can compare the daily returns of different companies. So from fundamental analysis, we are able to make decisions about which company is good for the investment and where to put our money in the hope of good growth. The latter part plays a vital role in taking positions such as entry and exit from the market to maximize our profit. Technical analysis tells us when to buy and when to sell.

Charts are a very crucial part of technical analysis because they tell us about the price movements and furthermore the expected direction of the price in upcoming times. Even enough information about the candlestick chart can make you investment savvy. So it is really important to understand and extract information thoroughly from charts.

So in this project, we are going to focus on the insights of the stock market's historical performance in different types of charts as well as comparisons of the yearly and daily returns of different companies. So these visualizations are carried

out from the large pool of live datasets in such a way that any layman person would be able to make inferences about an investment decision in any particular company. It is obvious that visualizations are going to be **time series charts** because our data points are in specific time intervals.

PROJECT OBJECTIVES

By the end of this project, we would like to achieve a fully dynamic and interactive web-app which contains the insights about the American stock market NYSE. We aim to include historical performance of all the listed companies under the NYSE stock exchange and even with the flexibility of choosing any particular date range. We are planning to show all the time series related data into four different charts such as candlestick chart, Matchstick chart, bar chart and line chart as well. Furthermore, we would also like to showcase the comparisons of returns in an informative bubble chart. Moreover, we would like to carry out some animated visualizations where we can visualize the change in prices of FAANG stocks over many years.

DESCRIPTION

In this project, we have made a web-application using the shiny package of R in RStudio. All the visualizations and web-application components are made using R. Shiny package provides a powerful platform for building web applications in R. Mainly there are two components, UI and server where UI contains all the front-end side of the application and server has all the back-end logic. Even shiny as well as R provides really helpful libraries to make charts easily.

So on the first tab of the web-app, the time-series visualizations of historical performance of 2800 companies listed in New York Stock Exchange (NYSE) is displayed. Here, for the better user experience, we have provided a side layout with an option to choose any stocks from the auto-suggestion drop-down menu. It will give suggestions of stocks automatically as you start typing the ticker name of a

company. Ticker name is nothing but just an unique series of letters assigned to a trading company. After selecting a ticker name, you can select the date range which is start and end date. By default, the date range is chosen from the past 90 days till the current date. Then the next interesting option is to select the type of the chart. There are four options to select such as candlestick chart, matchstick chart, bar chart and line chart. After your selection you can go apply it by pressing the show button and the chart according to the data provided will show up in the main area. Talking about the chart shown, it has date as x-axis and prices as y-axis as well as it has a bar chart of volume(in millions) traded per any day below the chart. In the volume chart, the red bar means selling and the green bar means buying. A title of the chart shows the ticker name of the company which chart is being displayed. For stock market technical analysis, candlestick charts are considered to be a great asset. You can see green and red candles where a green candle means the opening price of the stock is less than the closing price and vice versa for red candles. The information can be seen above the chart which shows some details regarding the company.

The second tab of this web-app presents the bubble chart. This chart can be used to infer which company has given the sufficient amount of returns. It has 4 channels such as today's return as x-axis same as yearly return as y-axis then size of the bubble and color hue. The same as the first tab, here we can select multiple stocks ticker names from the multiple auto-suggestion drop-down menu available on the left sidebar layout. By default, we have kept selected a few consumer discretionary stocks such as nike, disney, macdonald's, starbucks and TJX but you can remove and select any and add multiple ticker names there. After tickers selection and pressing the show button, the bubble chart containing different colors and different sizes of bubbles will show up in the main area. We have used googleViz library to make the bubble chart. Here, different colors of bubbles represent the different companies and different sizes of bubbles represent the amount of return each company has provided compared to others. This functionality would help one easily to spot the difference and find suitable stocks to invest in the hope of better return. Even a tooltip is shown when you move your cursor over the bubble. The higher the bubble the more yearly return it has given.

Coming onto the next interesting chart which is on the third tab. So, basically it is an animated race bar chart of FAANG stocks. First of all, FAANG is an acronym which refers to the big most popular and best-performing tech companies in the United States. FAANG stands for Facebook, Apple, Amazon, Netflix and Google. Thus, this chart exhibits the race bar chart between these five companies from 2011 to 2021. This race chart provides a holistic view of the change in the price of these five companies over the given time period. In order to make this chart, we have used the function named barChartRace from ddplot library. You can see how each company has performed comparatively. Here, the x-axis represents the prices and y-axis represents the company. Company with the highest price moves up and the company with the lowest price moves down accordingly.

As it can be seen from this race bar chart how Amazon has performed over the given time period beating others significantly.

CONCLUSION

So in the first tab, candlestick chart is the best chart to pick up for having good insights on the price direction of the stock. Looking at the chart, you can see the direction of the price movement by deciding whether a bunch of green candlesticks are together then it can be understood that the price is moving up and vice versa for the red candlesticks. The other best thing you can consider in this chart is the bar chart of traded volume given for any day. The green bars show the bull-ish market whereas red bars show bear-ish market condition.

From the second tab, we can conclude from the bubble chart that we can select high yearly return stock for long-term investment from a bunch of preferred stock. The comparison for fundamental analysis has become super easy with this chart.

In the last tab with an animated chart, It is really apparent how the stock of gigantic company Amazon has performed over the given period of time beating others very significantly.

Therefore, we can conclude that these visualizations are sufficient to perform fundamental analysis as well as technical analysis on the stock market.

DATA DESCRIPTION AND DATA PREPROCESSING

In order to get the list of all the listed stocks under New York Stock Exchange, we downloaded the csv file from nasdaq's website (link given below). So we extracted all the symbols from this csv file by subsetting the data frame and pumped all the symbols into auto-suggestion dropdown options.

Now all the historical price data is being fetched from yahoo finance and these data are near-real-time data. In order to fetch these data from yahoo finance, we have used a very useful quantmod library in R. Once near-real-time data is fetched from yahoo finance, we use the necessary columns such as open, close, low, high, volume and adjusted price to feed into our plot. To get more financial details of a stock such as full name, exchange name, financial currency, 52-week high, 52-week low etc. , we have used YahooQF to get all these quotes.

While making a bubble chart, we consider removing date, high, low columns and only consider open and close prices by subsetting the data frame. A function collects data from yahoo finance and merges the data because here we have multiple numbers of stocks to compare so we union data frames of each stock into one. Then in order to calculate the percentage of today's return of a stock, we subtract the close price and open price of the day which is divided by the open price and multiply this value by 100. The same subtraction way to calculate the percentage of year's return but we use the starting opening price of the stock instead of the current open price. Then the data is fed into the bubble chart.

For the race bar chart, we fetched the data of past 10 years from current day by setting start and end dates from yahoo finance. We merged the Close price column from all five stocks and renamed the column's name properly and according to the company it belongs to. Then the data is fed into the race bar chart from ddplot library.

RESOURCES AND REFERENCES

- To get list of all the symbols:
  - https://www.nasdaq.com/market-activity/stocks/screener
- Quantmod package
  - https://www.rdocumentation.org/packages/quantmod/versions/0.4.18
- A candlestick explanation image
  - https://www.wikihow.com/images/thumb/e/eb/Read-a-Candlestick-Chart-Step-1.jpg/v4-460px-Read-a-Candlestick-Chart-Step-1.jpg.webp
- For near-real-time data
  - https://in.finance.yahoo.com/
- Googlevis package
  - https://cran.r-project.org/web/packages/googleVis/vignettes/googleVis_intro.html

In order to see the outcome of a web-application go to this link:

https://pjustin.shinyapps.io/DataVizProject/