

# TESLA INC. STOCK PRICE ANALYSIS USING PYTHON



*A  
Project  
Report  
Submitted  
By*

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***FORE SCHOOL OF MANAGEMENT***

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## **1. Introduction**

This report gives a brief overview of the project entitled 'Tesla Inc. stock price analysis using Python'. It would give an overlook of the project, coding analysis, general description of data, and the statistical as well as mathematical analysis of the data. It has been observed in the last few decades that there has been an increase in demand for the analyzing, manipulating, and understanding of basic data hence, this project and the following study were relevant as suggested by the mentor. This analysis and manipulation of data using Python allows us to understand and compute predictions and decisions based on patterns and charts. The project analysis was done on the Google Collab Platform using the Python language. For this project, I have chosen to get the stock price data of Tesla Inc. from the website called Kaggle. This report will incorporate computation and study of various graphs and charts along with descriptive statistical study.

## **2. Project Objectives**

My main objective to learn and build this study project is to learn about a technology that is used in the contemporary world in too much demand. One of the other main motives of this study was to understand how to use Python to make useful analyses and inferences of any given data. Some of the other highlighted objectives are:

### **2.1.Data Acquisition from Kaggle:**

Our first and foremost objective is to acquire a pertinent dataset from Kaggle. This step ensures working with reliable and well-structured data. The objective is to identify a dataset that aligns with our analytical goals and to prepare it for analysis using proper data extraction techniques.

### **2.2.Data Analysis for Useful Inferences:**

Raw data, while valuable, becomes truly powerful when transformed into actionable insights. Our second objective revolves around delving deep into the data to extract meaningful patterns, correlations, and trends. By using advanced analytical tools, we will examine the dataset, ensuring every variable, data point, and pattern is scrutinized, allowing us to draw valid and insightful conclusions.

### **2.3.Chart Design Using Python:**

Visualization plays a critical role in data interpretation. Therefore, the next objective is to represent our findings visually. Using Python's libraries, such as Matplotlib and Seaborn, we aim to design charts and depict data. The purpose of our work is to ensure clarity and precision while using bar charts, histograms, or heat maps.

### **2.4.Derivation of Managerial Insights:**

In addition to statistical findings, I aim to bridge the gap between data analysis and managerial decision-making. By correlating our analytical findings with real-world scenarios, market dynamics, and industry benchmarks, we will derive actionable insights. These insights will be framed in a manner that caters to decision-makers, offering them a clear roadmap on leveraging the data for tangible benefits.

### 3. General Description of Data

The data presented in the project was picked up from Kaggle. For my dataset, I chose Tesla Inc.'s stock prices, a trailblazing company leading the electric vehicle revolution and developing sustainable energy technologies. As a prominent stock market player, Tesla's volatile stock price movements, and its value as a focal point of interest for investors, analysts, and enthusiasts made it an ideal dataset for this analysis. This dataset contains about 9 columns containing columns namely Date, Open, High, Low, Close and Adj close. These columns represent the following data:

**3.1.Open:** This column captures the price from the first transaction of a trading day.

**3.2.High:** The 'High' column records the maximum price Tesla's stock achieved during a trading day.

It is indicative of periods of strong demand or positive news catalysts.

**3.3.Low:** Conversely, the 'Low' column logs the minimum price point during a trading day.

**3.4.Close:** Concluding the trading day, the 'Close' column registers the price from the last transaction.

This is a vital metric, often used as the reference point for the next trading day and for historical analysis.

**3.5.Adj Close:** Delving deeper, the 'Adj Close' or Adjusted Closing Price adjusts the closing price to reflect the true value of the stock after considering factors such as dividends, stock splits, or new stock offerings. It provides a more accurate representation for analysts tracking long-term performance.

**3.6.Volume:** Quantifying the level of activity, the 'Volume' column showcases the number of Tesla Inc. units traded in a single day. High volumes can indicate strong investor interest, potential news releases, or significant market shifts, making this an essential metric for gauging market sentiment.

This data is then uploaded to Google Collab in the form of data frame for further analysis and work on the data

	Date	Open	High	Low	Close	Adj Close	\
0	2022-08-29	282.829987	287.739990	280.700012	284.820007	284.820007	
1	2022-08-30	287.869995	288.480011	272.649994	277.700012	277.700012	
2	2022-08-31	280.619995	281.250000	271.809998	275.609985	275.609985	
3	2022-09-01	272.579987	277.579987	266.149994	277.160004	277.160004	
4	2022-09-02	281.070007	282.350006	269.079987	270.209991	270.209991	
..	...	...	...	...	...	...	
246	2023-08-22	240.250000	240.820007	229.550003	233.190002	233.190002	
247	2023-08-23	229.339996	238.979996	229.289993	236.860001	236.860001	
248	2023-08-24	238.660004	238.919998	228.179993	230.039993	230.039993	
249	2023-08-25	231.309998	239.000000	230.350006	238.589996	238.589996	
250	2023-08-28	242.580002	244.380005	235.360001	238.820007	238.820007	
	Volume	Cumulative Open	Price Change				
0	41864700	282.829987	NaN				
1	50541800	570.699982	5.040009				
2	52107300	851.319977	-7.250000				
3	54287000	1123.899963	-8.040009				
4	50890100	1404.969971	8.490021				
..	...	...	...				
246	130597900	51401.759949	18.699997				
247	101077600	51631.099945	-10.910004				
248	99777400	51869.759949	9.320007				
249	106345900	52101.069946	-7.350006				
250	107330224	52343.649948	11.270004				
[251 rows x 9 columns]							

**Fig 3.1. Output showing table of Tesla Inc dataset.**

## 4. Analysis: Basic Descriptive & Mathematical or Statistical Analysis

In order to decipher Tesla Inc.'s stock prices, we meticulously analyse a multitude of data points. The goal is to translate these numbers into comprehensible insights that reveal Tesla's journey on the stock market. I used the following statistical analysis and descriptive analysis to get insights into Tesla Stock Prices.

**4.1.Descriptive Statistics:** At the onset, our analytical approach commenced with generating descriptive statistics. Data projects must begin with this step to gain an understanding of the dataset's central tendencies, spreading, and shapes.

**4.1.1. Key Metrics:** By determining the mean, we gauged an average value, offering a baseline to compare individual data points. The standard deviation gave us an understanding of the variability or volatility of the stock prices. Meanwhile, the minimum and maximum values shed light on the stock's lowest and highest valuations over the considered period. I also computed the datatype of the data frames to get the understanding kind of values asserted in each column.

```

count    Open      High      Low      Close    Adj Close \
mean    208.540438  213.040358  203.648127  208.426494  208.426494
std      48.217368   48.610792   47.720669   48.145007   48.145007
min     103.000000  111.750000  101.809998  108.099998  108.099998
25%     176.635002  182.419998  172.504997  178.474998  178.474998
50%     198.539993  203.000000  192.889999  197.580002  197.580002
75%     249.385002  253.034996  242.389999  249.570000  249.570000
max     308.290009  313.799988  305.579987  309.070007  309.070007

count    Volume    Cumulative Open    Price Change
mean    1.274835e+08  26010.168127    -0.161000
std      4.724183e+07   13961.264129     8.194105
min      4.186470e+07    282.829987    -24.360001
25%      9.351960e+07   15209.229912    -6.415005
50%      1.219993e+08   25352.179886    -0.695007
75%      1.599710e+08   36608.089920     5.782497
max      3.065906e+08   52343.649948    24.850006
Index(['Date', 'Open', 'High', 'Low', 'Close', 'Adj Close', 'Volume',
      'Cumulative Open', 'Price Change'],
      dtype='object')

```

**Fig 4.1. Output showing descriptive analysis of the dataset.**

```

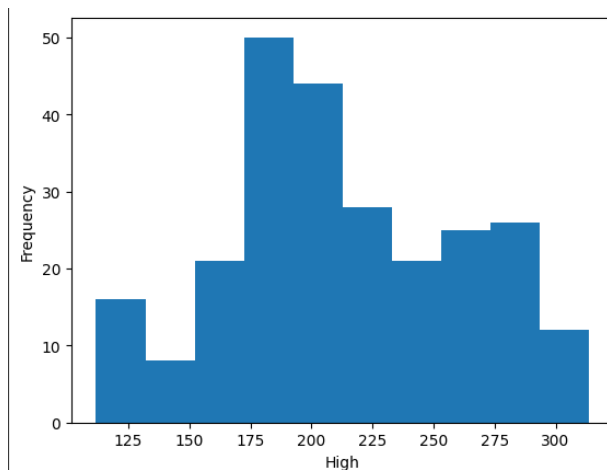
Date      object
Open      float64
High      float64
Low       float64
Close     float64
Adj Close float64
Volume     int64
Cumulative Open float64
Price Change float64
dtype: object

```

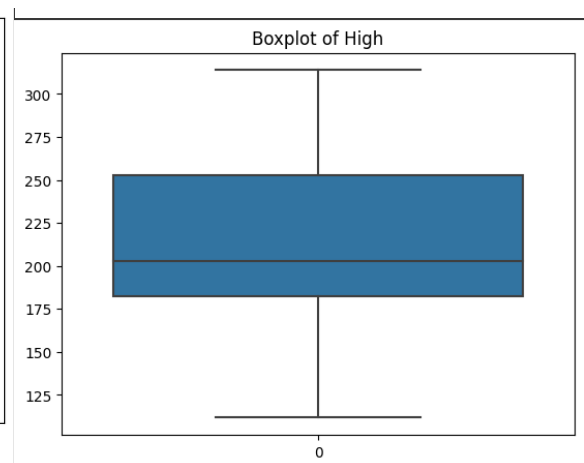
**Fig 4.2. output showing datatype of dataset**

**4.2.Exploratory Data Analysis (EDA):** An intrinsic part of our analysis involved visually exploring the data to discern patterns, anomalies, or relationships among the variables.

- 4.2.1. Histograms:** These graphical representations provided an immediate visualization of the distribution of the stock prices. Through histograms, we could ascertain the frequency of specific price ranges, noting any skewness or kurtosis in the distribution.
- 4.2.2. Boxplots:** A quintessential tool for understanding data dispersion and detecting outliers, boxplots were employed to visualize the interquartile range, median, and potential anomalies in the stock prices.



**Fig 4.3. Histogram of the dataset**



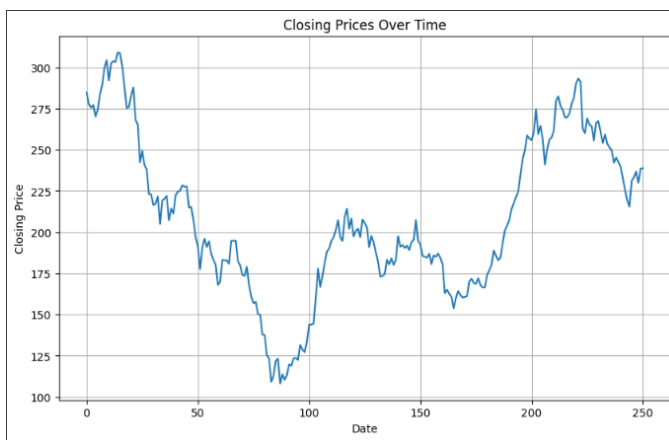
**Fig 4.4. Boxplot of the dataset**

**4.3.Correlation Analysis:** Establishing relationships between variables is pivotal to understand how one metric impacts another. Our project dived deep into this with correlation analysis.

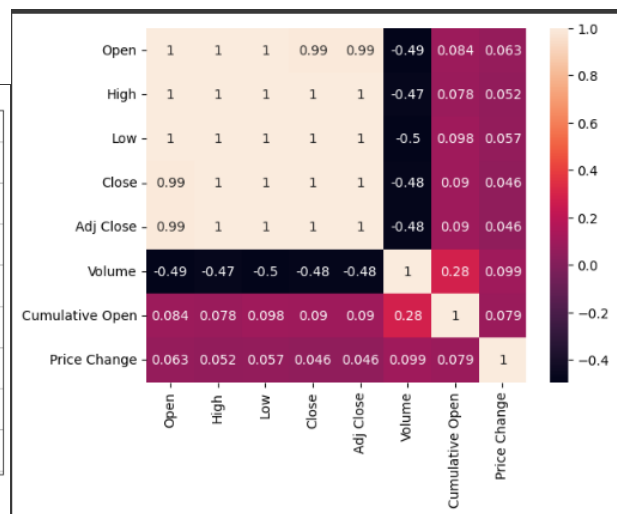
**4.3.1. Heatmap:** Serving as a color-coded representation, the heatmap was utilized to provide an immediate visual summary of the correlation between different stock attributes. Darker or lighter shades indicated the strength and direction of the relationship, offering a quick, intuitive understanding.

**4.3.2. Scatter Plots:** These plots enabled us to visualize potential relationships or trends between two variables, serving as a foundation for establishing linear or non-linear associations.

**4.3.3. Line Graphs:** Tracking the stock's trajectory over time, line graphs were instrumental in visualizing trends, potential cyclical patterns, and significant inflection points in Tesla's stock valuation.



**Fig 4.5. Line graphs**



**Fig 4.6. Heat Maps**

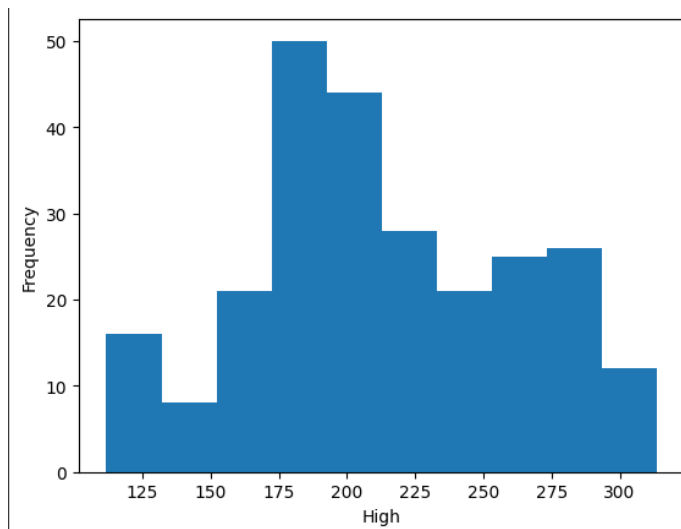
## 5. Findings And Inferences

The above-mentioned analysis helps organizations in getting a compass, guiding stakeholders through the discoveries we've unearthed and the subsequent interpretations of these findings. Translating these numbers and graphs into meaningful insights requires a meticulous process of dissection, exploration, and synthesis. In this section, this synthesis will be carried out of each of the analyses made in the project.

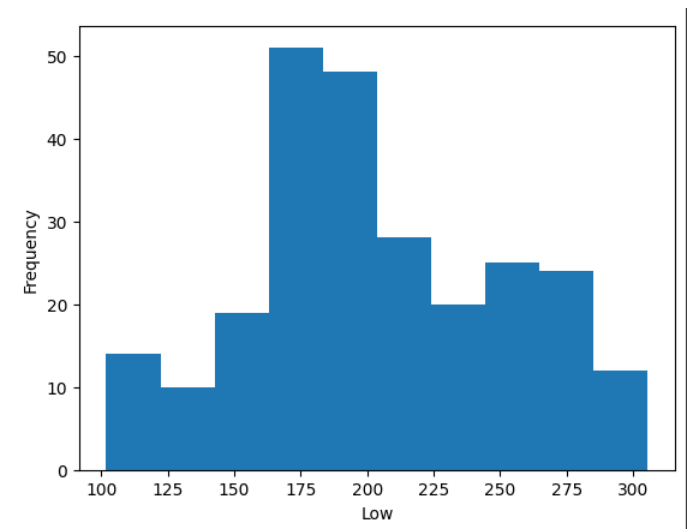
**5.1. Inference of Histograms:** In the project, I have used two histograms, one of which depicts the frequency of the times when 'High' stock prices have ranged within a given value. The other depicts the frequency of the times when 'Low' stock prices have ranged within a given value.

From the first histogram, it can be predicted that the highest frequency of stock prices ranging in the 'High' values was within the range of 175-185 stock prices.

From the second histogram, it can be predicted that the highest frequency of stock prices ranging in the 'Low' values were within the range of 160-180 stock prices.



**Fig 5.1. Histogram representing 'High' values**



**Fig 5.2. Histogram representing 'Low' values**

## 5.2. Inferences of the Graphs:

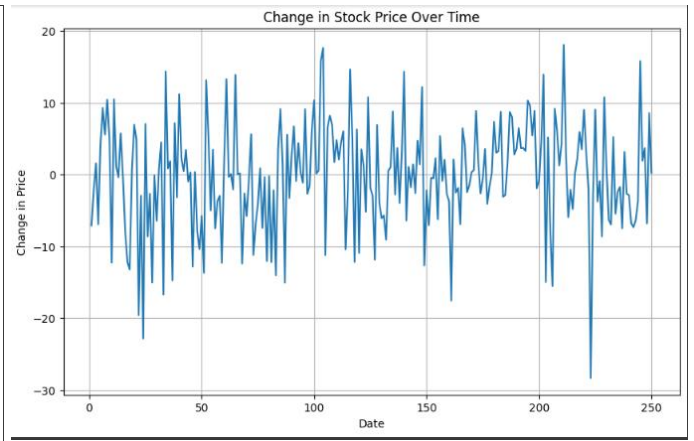
Within the projects, several graphs have been used to understand the behaviour of Tesla stock prices. The following are the graphs used and data inferred.

- 5.2.1. Closing prices over time:** This graph shows the change in closing prices of the stock over a period of time. We can see that this graph shows that at the start of the dataset, the closing prices of Tesla Inc, were doing great with a maximum closing price crossing 300+. However, there was a dip in the stock price in the middle but the stock picked back up and started closing with decent stock price values.
- 5.2.2. Change in stock price over time:** This graph gives an overview of the overall performance of the stock within the time interval for which the data set is chosen. It can be clearly seen from the graph that the stock is highly volatile since the rise and fall of the stock can be seen at extreme values.
- 5.2.3. Cumulative change in stock price:** This graph gives a cumulative analysis of closing, opening, high, and low stock price values and maps the performance of the stock within the time interval for which the data set is chosen. This graph sees a similar pattern to that in graph 1 wherein, starting off, Tesla Inc's closing prices were doing great, after which there was a dip, but the stock recovered and closed with decent stock prices.

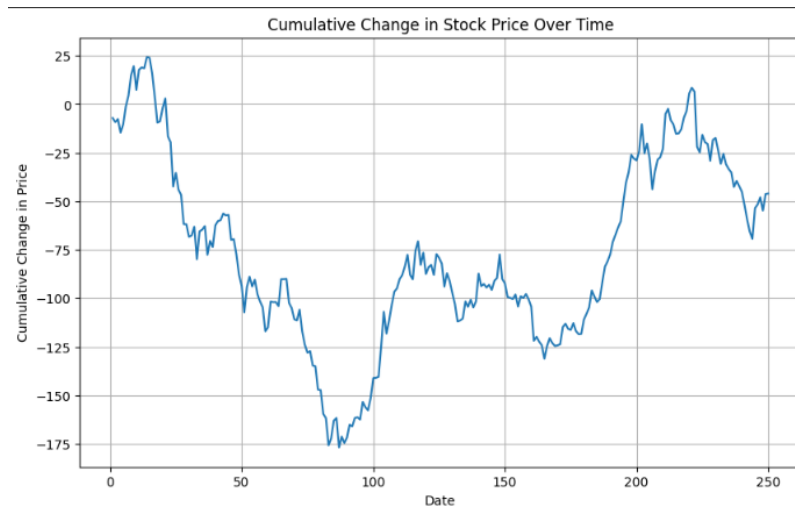




**Fig 5.3. Graph representing Closing prices over time**



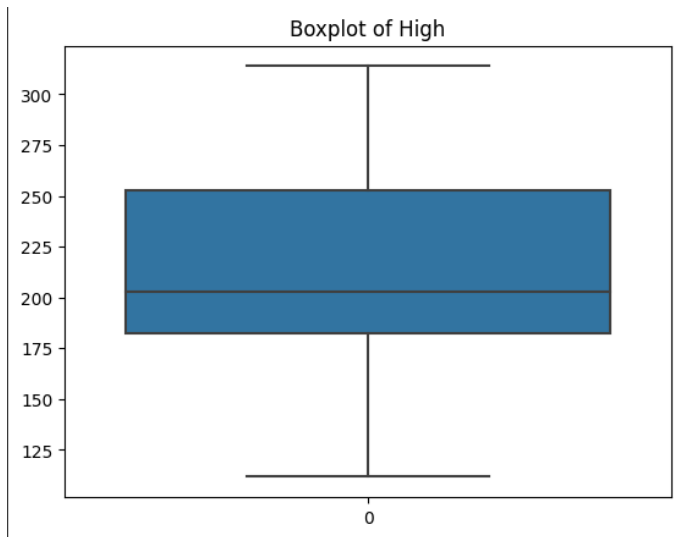
**Fig 5.4. Graph representing Change in stock prices over time**



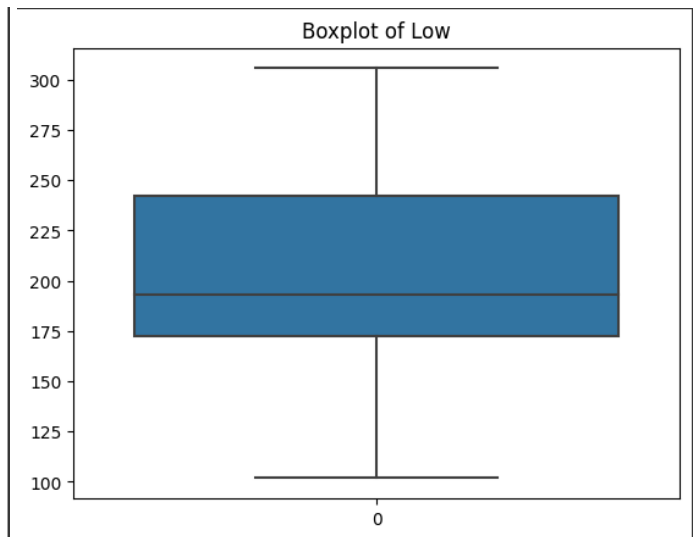
**Fig 5.5. Graph representing Cumulative Change in stock prices over time**

### 5.3.Inference of the Boxplots:

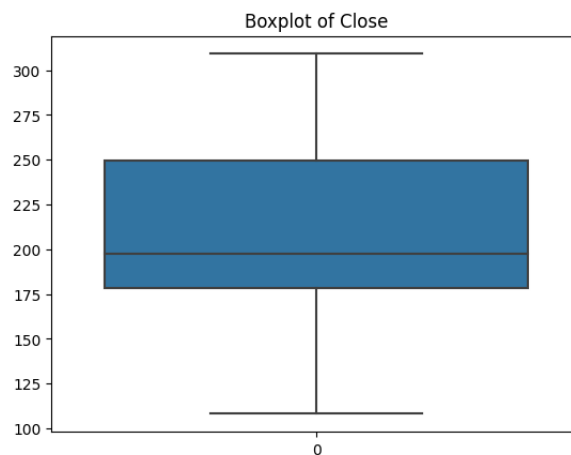
Boxplots provide us with a fair idea of depicting the distributions of one or more groups of numeric data and whether our data lies within the range of central tendency or not. Given our Tesla Inc dataset, we can understand how far our data lies from the central tendency. For this analysis, I have used the boxplots for 'High' values of stock prices, 'Low' values of stock prices, and closing values of stock prices. Within each boxplot it can be observed that these stock prices are not symmetric. Rather, these are left skewed.



**Fig 5.6. Boxplot representing 'High' values**

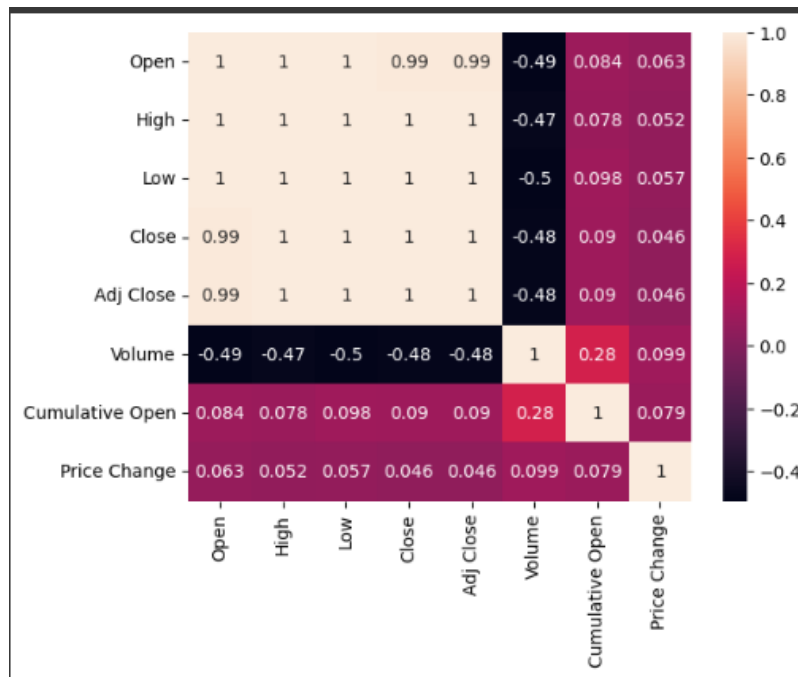


**Fig 5.7. Boxplot representing 'Low' values**



**Fig 5.7. Boxplot representing 'Close' values**

**5.4. Inference of the Heat Maps:** Correlation heatmaps present correlations between multiple variables as color-coded matrixes. Correlation heatmaps show the correlation between variables based on their rows and columns. Within the dataset, both rows and columns of the heatmap generated, comprised of the open, close, high, low volume, and cumulative open sets. With darker colors indicating stronger correlations, each cell's color indicates the strength and direction of the correlation. Hence, we can infer stronger correlation within attributes like volume-open, close-price-change, open-open



**Fig 5.8. Correlation analysis using heat maps**

## 6. Managerial insights

Based on the comprehensive analysis conducted on Tesla's stock prices, which encompassed a detailed examination of opening, closing, high, and low values, there are compelling indicators suggesting a favorable outlook for Tesla's stocks. The trends highlighted in the line graphs, combined with the patterns observed in histograms, underscore a robust and dynamic stock performance. Furthermore, the descriptive statistics derived from the opening and closing values, along with the highs and lows, provide a granular understanding of the stock's trajectory. These metrics, when evaluated holistically, present a positive momentum for Tesla, making it a potentially promising addition to an investment portfolio. However, it's essential to understand that every investment carries risks, and one should always consider their financial position, risk tolerance, and consult with financial advisors before making investment decisions.

