

Data Analysis of TCS Stock Price (Last 5 Years)

```
In [62]: import pandas as pd  
import matplotlib.pyplot as plt  
import seaborn as sns  
import numpy as np
```

```
In [63]: colors = ['#FF0000', '#00FF00',
```

```
In [64]: data = pd.read_csv("TCS.NS.csv")
```

```
In [65]: data # From 21 May 2018 to 19 May 2023
```

Out[65]:	Date	Open	High	Low	Close	Adj Close	Volume
0	2018-05-21	1764.349976	1796.000000	1759.025024	1778.375000	1595.874634	3446178
1	2018-05-22	1779.000000	1787.474976	1746.849976	1754.449951	1574.404541	1857416
2	2018-05-23	1762.500000	1772.500000	1740.500000	1747.550049	1568.212769	1507298
3	2018-05-24	1755.000000	1807.500000	1751.175049	1801.849976	1616.940552	2962316
4	2018-05-25	1812.500000	1837.400024	1786.275024	1792.900024	1608.908691	3769772
...
1230	2023-05-15	3284.000000	3292.000000	3248.350098	3255.050049	3255.050049	1150390
1231	2023-05-16	3256.199951	3285.000000	3250.449951	3258.149902	3258.149902	986306
1232	2023-05-17	3255.949951	3280.000000	3198.250000	3208.699951	3208.699951	1588815
1233	2023-05-18	3225.949951	3228.949951	3195.000000	3199.850098	3199.850098	1369364
1234	2023-05-19	3210.000000	3234.500000	3203.050049	3222.850098	3222.850098	1152449

1235 rows × 7 columns

Basic Data Formatting

```
In [66]: fresh_data = {
    "Date" : [],
    "Candle" : [],
    "Upper Wick" : [],
    "Body" : [],
    "Lower Wick" : [],
    "Close" : [],
    "Candle Length" : [],
    "Volume" : [],
    "Daily Return" : []
}

first_time = True

for i in data.index:
    o = data["Open"][i]
    h = data["High"][i]
    l = data["Low"][i]
    c = data['Close'][i]
```

```

if o > c: # Red candle
    fresh_data["Candle"].append("RED")
    fresh_data['Upper Wick'].append(h - o)
    fresh_data['Lower Wick'].append(c - l)
    fresh_data["Body"].append(o - c)
else:
    fresh_data["Candle"].append("GREEN")
    fresh_data['Upper Wick'].append(h - c)
    fresh_data['Lower Wick'].append(o - l)
    fresh_data["Body"].append(c - o)

fresh_data['Date'].append((data['Date'][i]))
fresh_data['Volume'].append(data['Volume'][i])
fresh_data["Close"].append(data["Adj Close"][i])
fresh_data['Candle Length'].append(h - l)

if first_time:
    change = 0
    previous_close = c
    first_time = False
else:
    change = round(((c/previous_close) - 1) * 100, 2)
    previous_close = c

fresh_data["Daily Return"].append(change)

```

In [67]: `fresh_data = pd.DataFrame(fresh_data)`

In [68]: `fresh_data`

	Date	Candle	Upper Wick	Body	Lower Wick	Close	Candle Length	Volume	Daily Return
0	2018-05-21	GREEN	17.625000	14.025024	5.324952	1595.874634	36.974976	3446178	0.00
1	2018-05-22	RED	8.474976	24.550049	7.599975	1574.404541	40.625000	1857416	-1.35
2	2018-05-23	RED	10.000000	14.949951	7.050049	1568.212769	32.000000	1507298	-0.39
3	2018-05-24	GREEN	5.650024	46.849976	3.824951	1616.940552	56.324951	2962316	3.11
4	2018-05-25	RED	24.900024	19.599976	6.625000	1608.908691	51.125000	3769772	-0.50
...
1230	2023-05-15	RED	8.000000	28.949951	6.699951	3255.050049	43.649902	1150390	-0.59
1231	2023-05-16	GREEN	26.850098	1.949951	5.750000	3258.149902	34.550049	986306	0.10
1232	2023-05-17	RED	24.050049	47.250000	10.449951	3208.699951	81.750000	1588815	-1.52
1233	2023-05-18	RED	3.000000	26.099853	4.850098	3199.850098	33.949951	1369364	-0.28
1234	2023-05-19	GREEN	11.649902	12.850098	6.949951	3222.850098	31.449951	1152449	0.72

1235 rows × 9 columns

To enhance the meaningfulness of the data, I implemented formatting changes. Firstly, I removed the variables "Open," "High," "Low," and "Close" and replaced them with more informative features. These new features include the data of the day candles, the length of the upper wick, the length of the body, the length of the lower wick, and the length of the overall candle. Additionally, I replaced the "Adjusted Close" with the "Close" value for consistency.

Moreover, I introduced a new column that indicates the color of the candle formed on each specific date. This column distinguishes between a green candle and a red candle, providing further insights into the market trends and price movements.

These formatting adjustments aim to provide more meaningful data for future analysis and facilitate a better understanding of the market dynamics.

Explanation of Columns in `fresh_data`:

Date: The date on which the trading occurred.

Candle: Indicates the color of the candle formed on the daily chart. It represents whether the price increased or decreased during the trading day.

Upper Wick: Refers to the length of the upper wick of the candle. The upper wick represents the highest price reached during the trading day.

Body: Represents the length of the body of the candle. The body signifies the price range between the opening and closing prices of the trading day.

Lower Wick: Denotes the length of the lower wick of the candle. The lower wick represents the lowest price reached during the trading day.

Close: Indicates the adjusted closing price of the trading day, which is the final price at which the trading session concluded.

Candle Length: Represents the total length of the candle, including both the upper and lower wicks and the body.

Volume: Represents the volume of shares traded on that specific date, indicating the level of market activity.

Daily Return: Indicates the percentage change in the closing price of the current day compared to the closing price of the previous day, representing the daily rate of return.

```
In [69]: fresh_data.isnull().sum() # We have no missing values
```

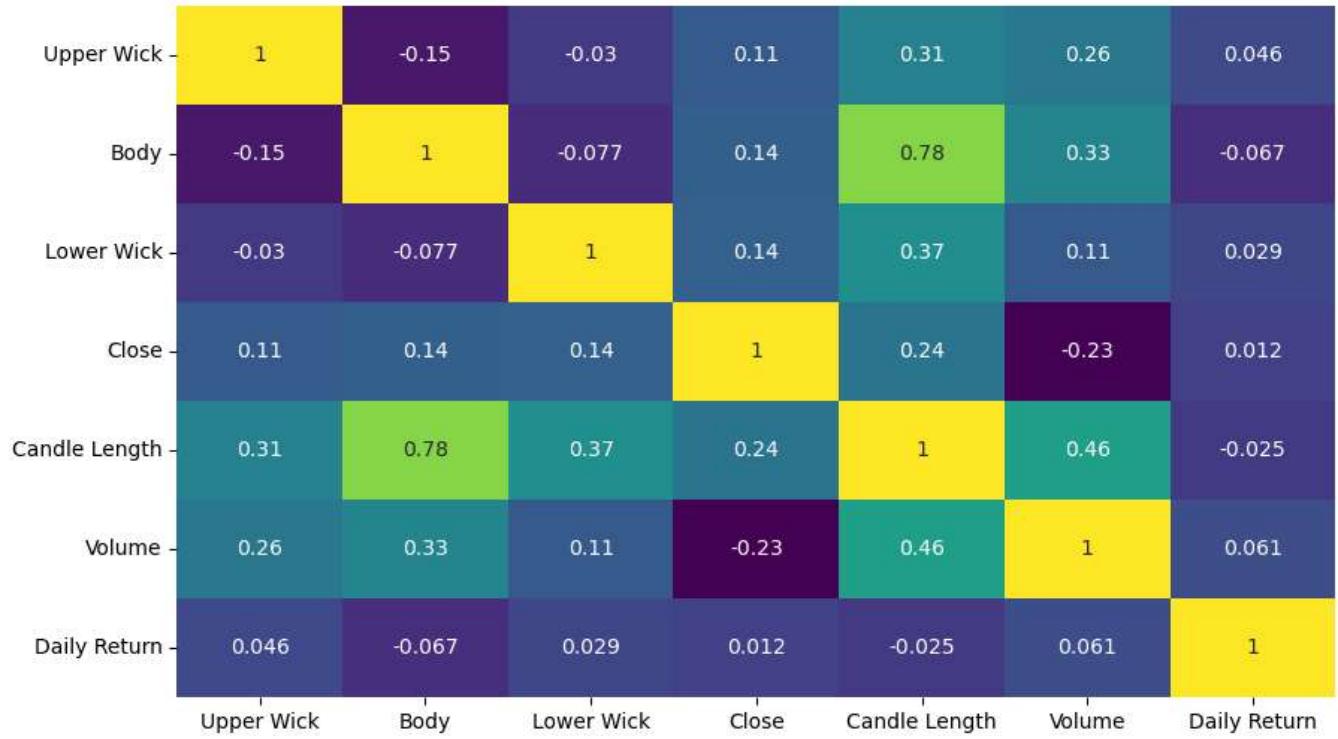
```
Out[69]: Date      0
          Candle    0
          Upper Wick 0
          Body      0
          Lower Wick 0
          Close     0
          Candle Length 0
          Volume    0
          Daily Return 0
          dtype: int64
```

Correlational Analysis between various features

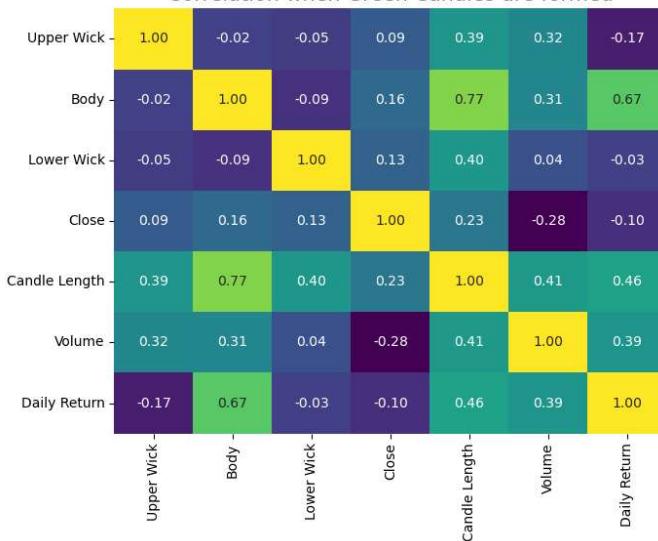
In [70]:

```
plt.figure(figsize=(10, 6))
plt.title("Correlation between various features", fontdict={"fontsize" : 20})
sns.heatmap(fresh_data.corr(), annot = True, cmap = "viridis", cbar=False)
plt.show()
plt.figure(figsize=(14, 6))
plt.subplot(1, 2 ,1)
sns.heatmap(green_data.corr(), annot = True, cmap = "viridis", cbar=False, fmt="1.2f")
plt.title("Correlation when Green Candles are formed", fontdict={"fontsize" : 15})
plt.subplot(1, 2 ,2)
sns.heatmap(red_data.corr(), annot = True, cmap = "viridis", cbar=False, fmt="1.2f")
plt.title("Correlation when Red Candles are formed", fontdict={"fontsize" : 12})
plt.tight_layout()
plt.show()
```

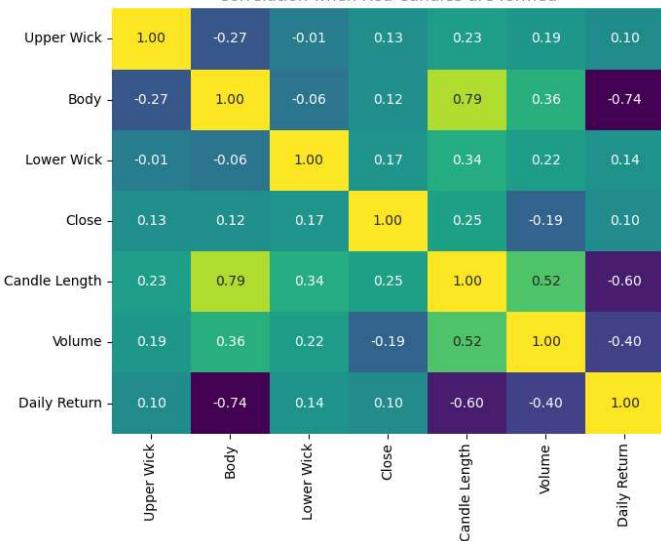
Correlation between various features



Correlation when Green Candles are formed



Correlation when Red Candles are formed



Observations:

Volume and Candle Length: There is a strong positive correlation between volume and candle length. A higher

trading volume is associated with longer candles, indicating increased volatility in the market. This suggests that larger price movements are more likely to occur when trading volume is higher.

Close and Volume: There is a negative correlation between the closing price and volume. As the trading volume increases, the closing price tends to decrease. This negative correlation suggests that higher trading activity is often accompanied by lower closing prices. It implies that increased volume may exert downward pressure on prices.

Volume and Candle Length based on Candle Color: The correlation between volume and candle length is more positive when red candles are formed, indicating an downward price movement. On the other hand, the positive correlation is less pronounced when green candles are formed, suggesting an upward price movement. This implies that higher volume is more strongly associated with larger candle lengths when prices are falling compared to when prices are rising.

Length of Upper Wick and Length of Body: There is always a negative correlation between the length of the upper wick and the length of the body of the candle. However, when green candles are formed, this negative correlation is less pronounced, whereas it becomes stronger for red candles. This indicates that the relationship between the length of the upper wick and the length of the body depends on the candle color.

Length of Body and Daily Return: Overall, there is an insignificant negative correlation between the length of the body and the daily return. However, when green candles are formed, there is a significant positive correlation between the two, suggesting that larger green candles are associated with higher daily returns. Conversely, when red candles are formed, there is a significant negative correlation, indicating that larger red candles are associated with lower daily returns. Similar is the case of Daily Return with Volume.

Basic Statistics

```
In [71]: fresh_data["Date"] = pd.to_datetime(fresh_data['Date'])
```

```
In [72]: fresh_data.index = fresh_data['Date']
```

```
In [73]: fresh_data.describe()
```

```
Out[73]:
```

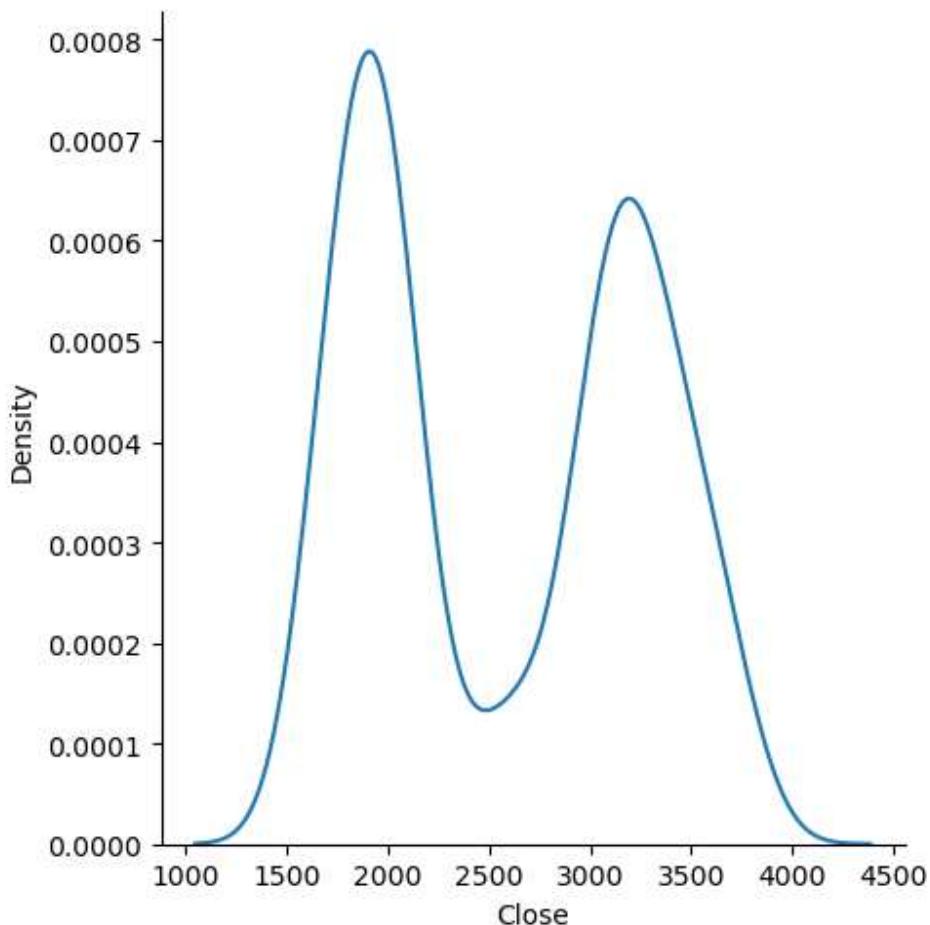
	Upper Wick	Body	Lower Wick	Close	Candle Length	Volume	Daily Return
count	1235.000000	1235.000000	1235.000000	1235.000000	1235.000000	1.235000e+03	1235.000000
mean	13.541577	27.802286	14.736734	2594.528698	56.080596	2.933749e+06	0.061077

std	12.524270	24.005869	12.414650	694.586911	27.190347	1.787561e+06	1.605572
min	0.000000	0.000000	0.000000	1550.249634	8.250000	1.445300e+05	-9.410000
25%	5.050049	9.750000	6.612549	1924.805054	37.025024	1.834612e+06	-0.740000
50%	10.149902	21.649902	11.699951	2607.799805	50.000000	2.498833e+06	0.060000
75%	18.949951	39.449951	20.000000	3218.211181	68.699951	3.449566e+06	0.880000
max	126.500000	167.449951	181.849975	3885.789551	313.949951	2.290380e+07	9.850000

Analysing Closing Price

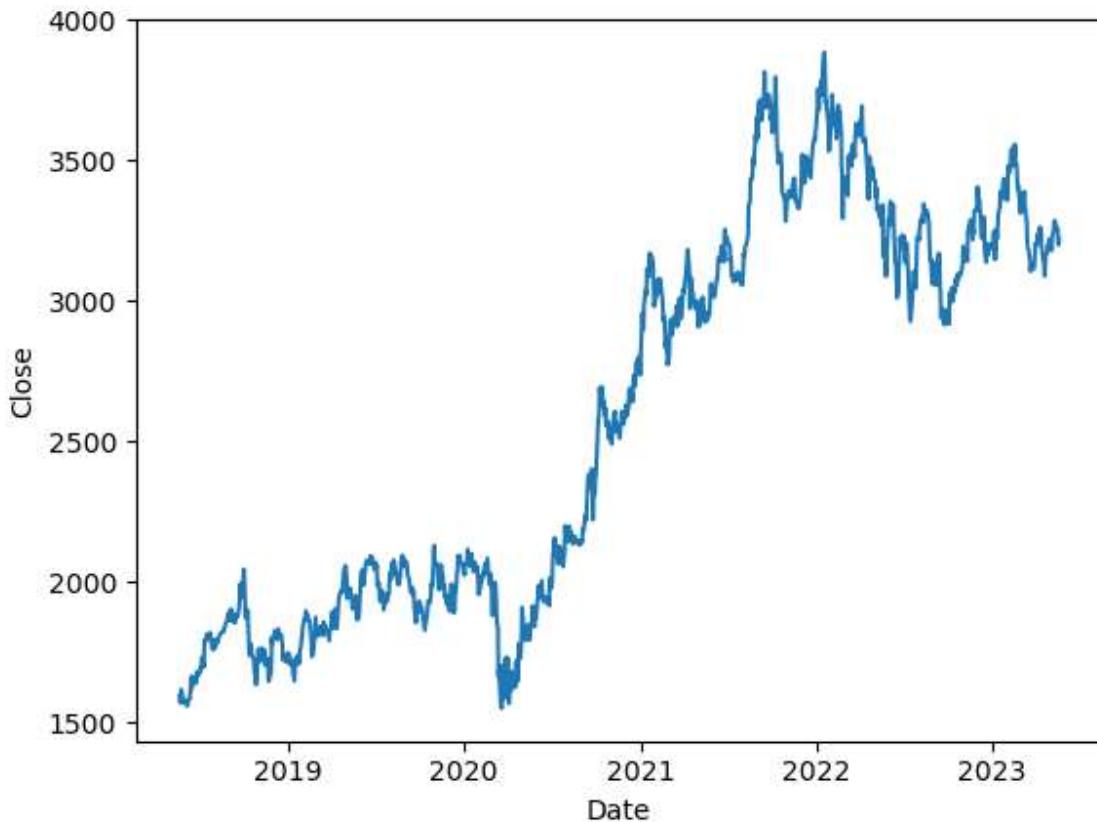
In [74]: `sns.displot(data= fresh_data, x = "Close", kind = "kde")`

Out[74]: `<seaborn.axisgrid.FacetGrid at 0x1a06c5a9550>`



In [75]: `sns.lineplot(data= fresh_data, x = fresh_data.index , y = fresh_data['Close'])`

Out[75]: `<AxesSubplot:xlabel='Date', ylabel='Close'>`

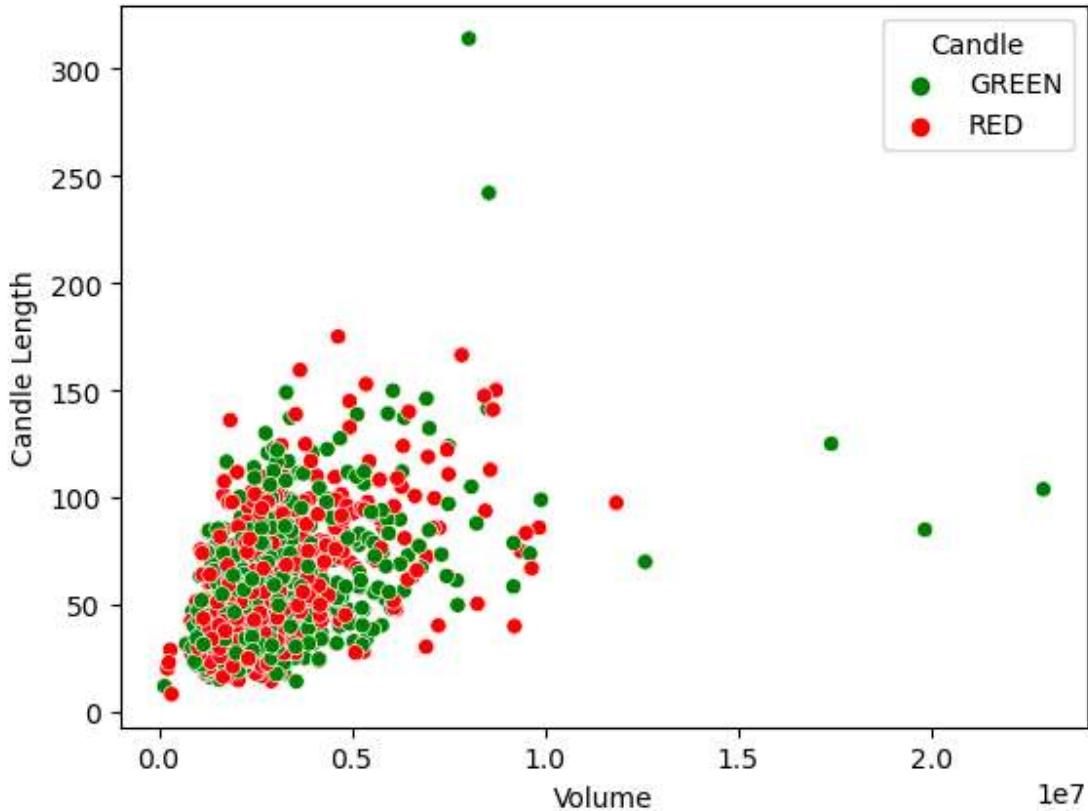


Observations:

We can observe that the stock remained at relatively stable levels for extended periods around 2000 and 35000. This pattern is also evident in the kernel density estimate (KDE) plot, where we can see two prominent peaks. The first peak corresponds to the period when the stock price was centered around 2000, while the second peak represents the time when the stock price was centered around 35000. The presence of these distinct peaks in the KDE plot reinforces the notion that the stock had prolonged periods of consolidation or stability around these specific price levels.

Analysing Volume

```
In [76]: sns.scatterplot(data = fresh_data, x = "Volume", y = "Candle Length", hue="Candle", pale  
Out[76]: <AxesSubplot:xlabel='Volume', ylabel='Candle Length'>
```

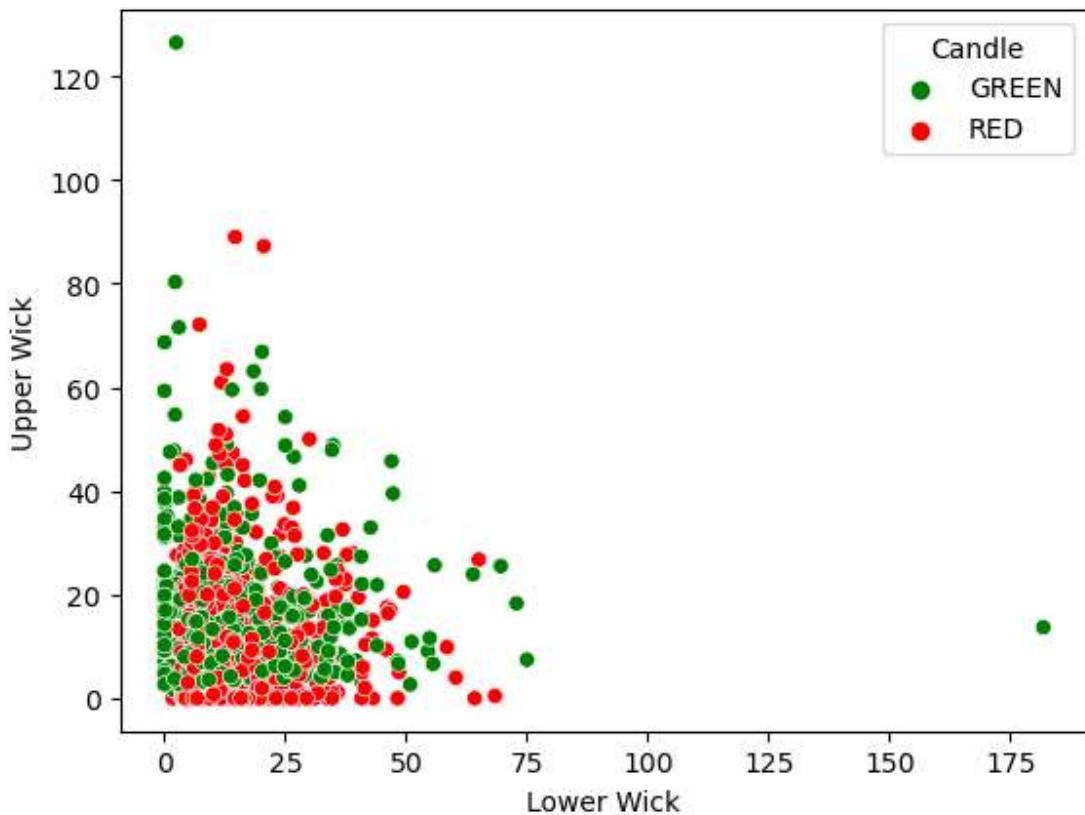


Observations

The scatter plot demonstrates the relationship between volume and the length of the candle. As the trading volume increases, length of the candle also increases. This visual representation provides strong evidence for a positive correlation between volume and candle length. The scatter plot highlights the pattern that higher trading volume tends to coincide with larger candle lengths, indicating a connection between trading activity and increased market volatility.

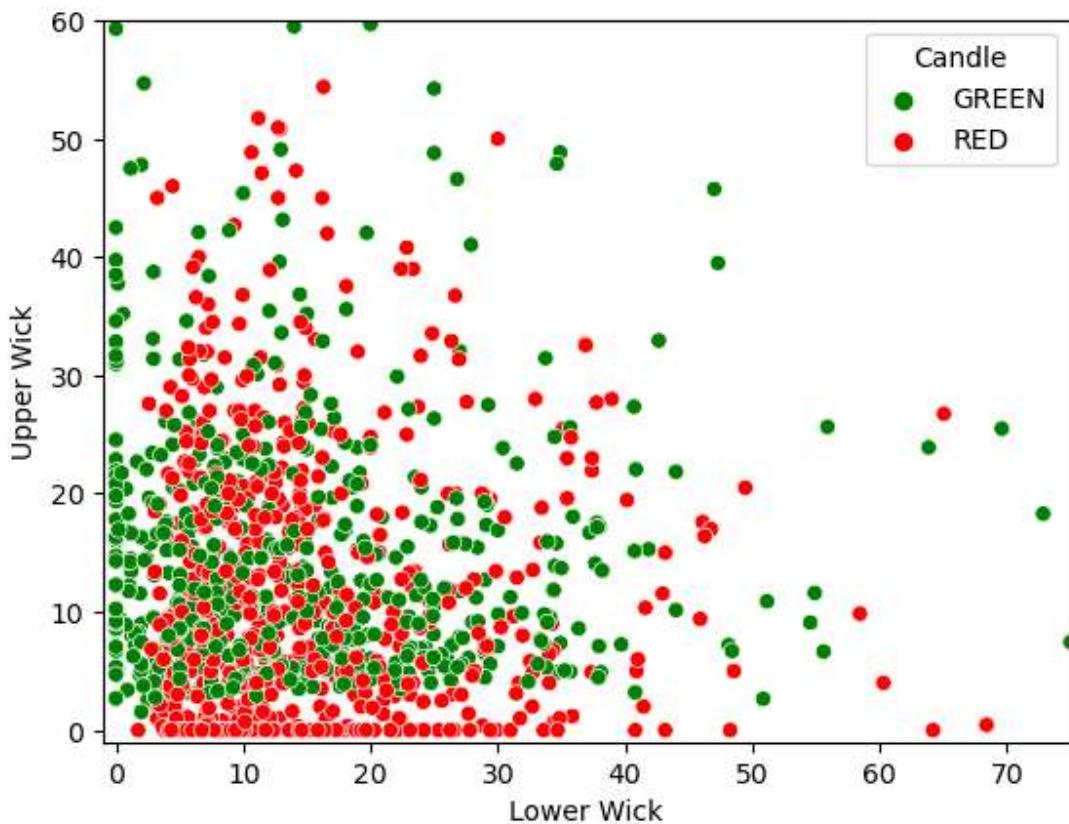
Analysing Length of Upper and Lower Wick

```
In [77]: sns.scatterplot(data= fresh_data, x = "Lower Wick", y = "Upper Wick", hue = "Candle", pa
Out[77]: <AxesSubplot:xlabel='Lower Wick', ylabel='Upper Wick'>
```



```
In [78]: sns.scatterplot(data= fresh_data, x = "Lower Wick", y = "Upper Wick", hue = "Candle", pa  
plt.ylim((-1, 60))  
plt.xlim((-1, 75))
```

Out[78]: (-1.0, 75.0)



Observations:

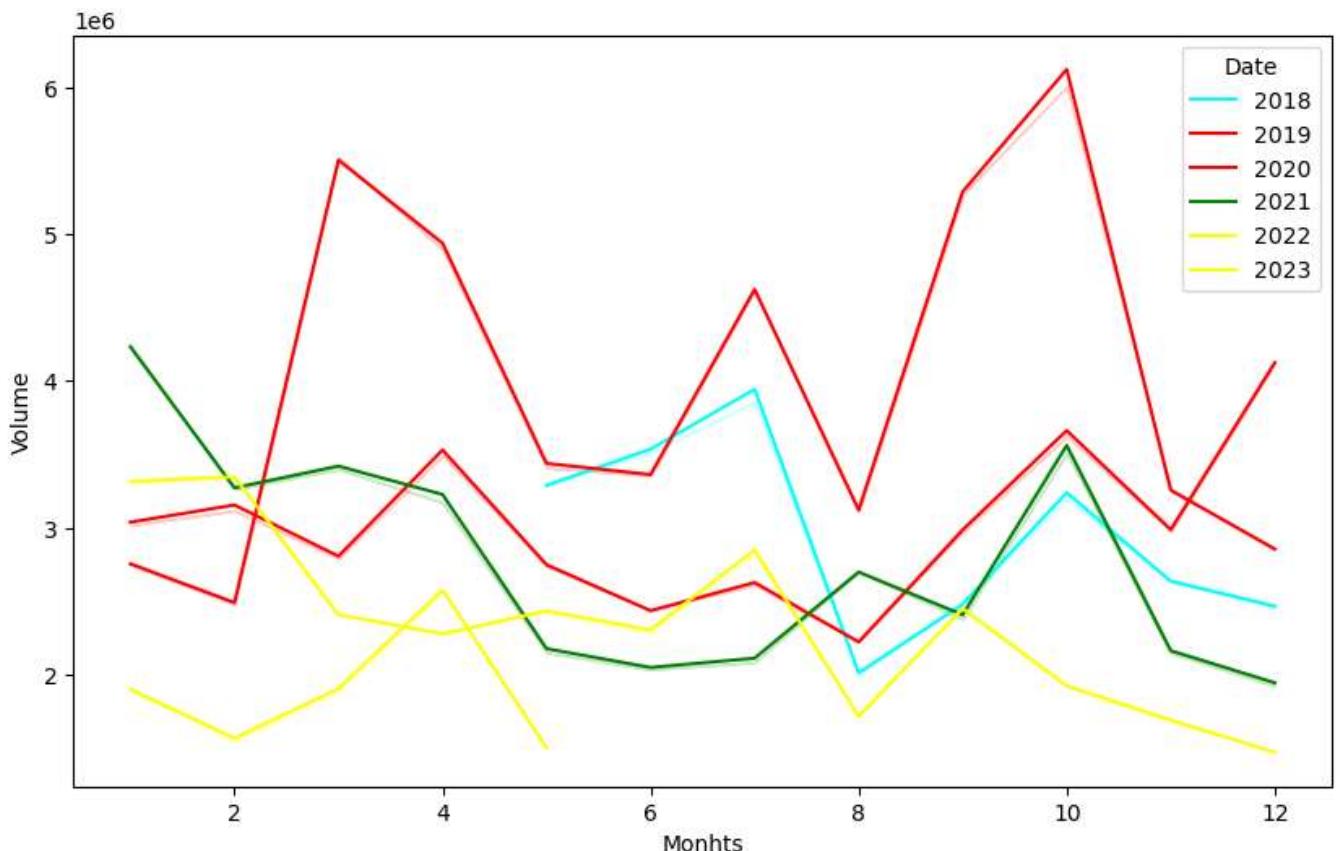
One important observation is that whenever we have red candles, the lower wick lengths are not equal to 0. Similarly, when green candles are formed, the upper wick lengths are not equal to 0. This implies that whenever there is a decrease in price, the closing point will not be at the lowest point of the day, and when the price is increasing, the closing point will not be at the highest point of the day.

In terms of the scatter plot, it exhibits a triangular pattern. For lower values of both upper wick length and lower wick length, there is not a strong correlation between them. However, for higher values of upper wick length or lower wick length, a negative correlation becomes evident between the two. This means that when the upper wick length or lower wick length exceeds 30, there is a tendency for longer upper wicks to be associated with shorter lower wicks, and vice versa.

Time Series Analysis - Volume

```
In [94]: c = np.random.choice(colors, 6)
plt.figure(figsize=(10, 6))
sns.lineplot(data= fresh_data, x = fresh_data.index.month, y = "Volume", ci = 0, hue=fre
plt.xlabel("Monhts")
```

```
Out[94]: Text(0.5, 0, 'Monhts')
```



```
In [80]: def quarter(data):
    if data.month <= 3:
        return 1
    elif data.month <=6:
```

```

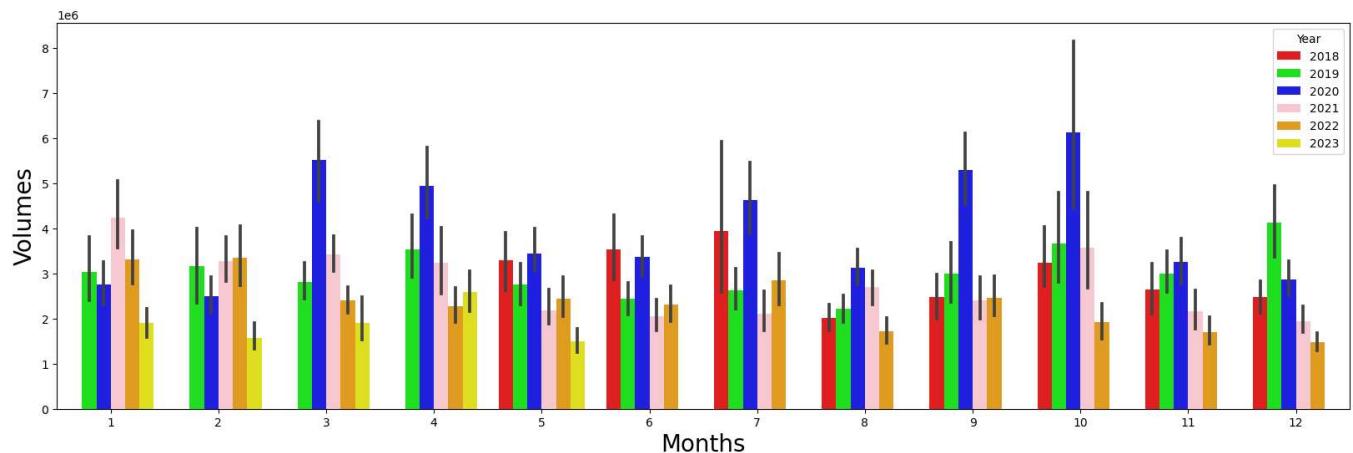
        return 2
    elif data.month <=9:
        return 3
    else:
        return 4
fresh_data["Quarter"] = fresh_data['Date'].apply(quarter)

```

In [81]: `fresh_data['Year'] = fresh_data.index.year`

In [82]: `plt.figure(figsize=(20, 6))
sns.barplot(data=fresh_data, x=fresh_data.index.month, y="Volume", hue="Year",
plt.xlabel("Months", fontdict={"fontsize":20})
plt.ylabel("Volumes", fontdict={"fontsize":20})`

Out[82]: `Text(0, 0.5, 'Volumes')`



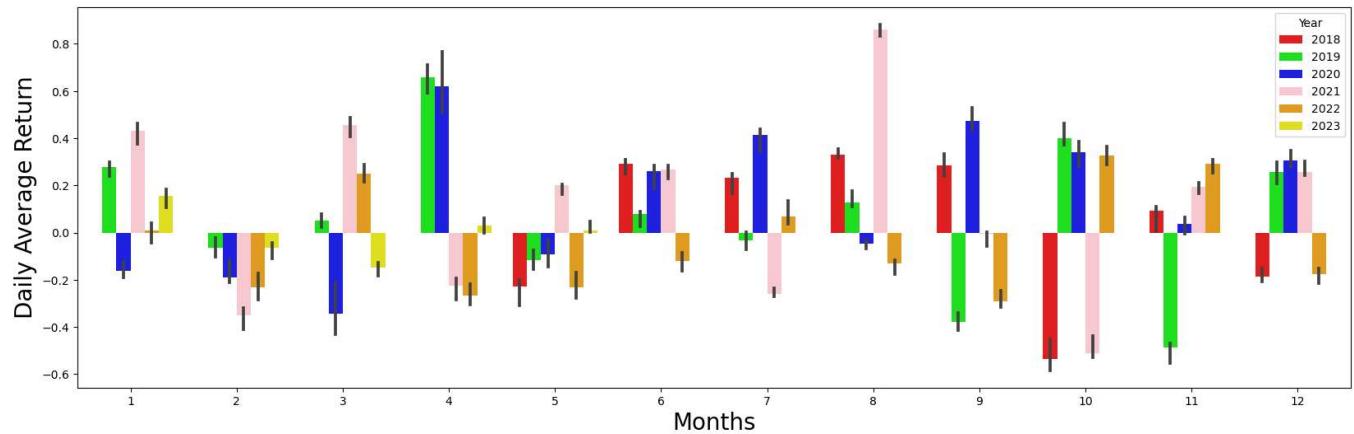
Observations

It can be seen from the above charts that trading activity generally tends to be higher in the months of March, April, July, September and October. This is because Volume tends to be higher for these years in all preceeding years from 2018.

Time Series Analysis - Daily Return

In [83]: `plt.figure(figsize=(20, 6))
sns.barplot(data=fresh_data, x=fresh_data.index.month, y="Daily Return", hue="Year",
plt.xlabel("Months", fontdict={"fontsize":20})
plt.ylabel("Daily Average Return", fontdict={"fontsize":20})`

Out[83]: `Text(0, 0.5, 'Daily Average Return')`



Observations:

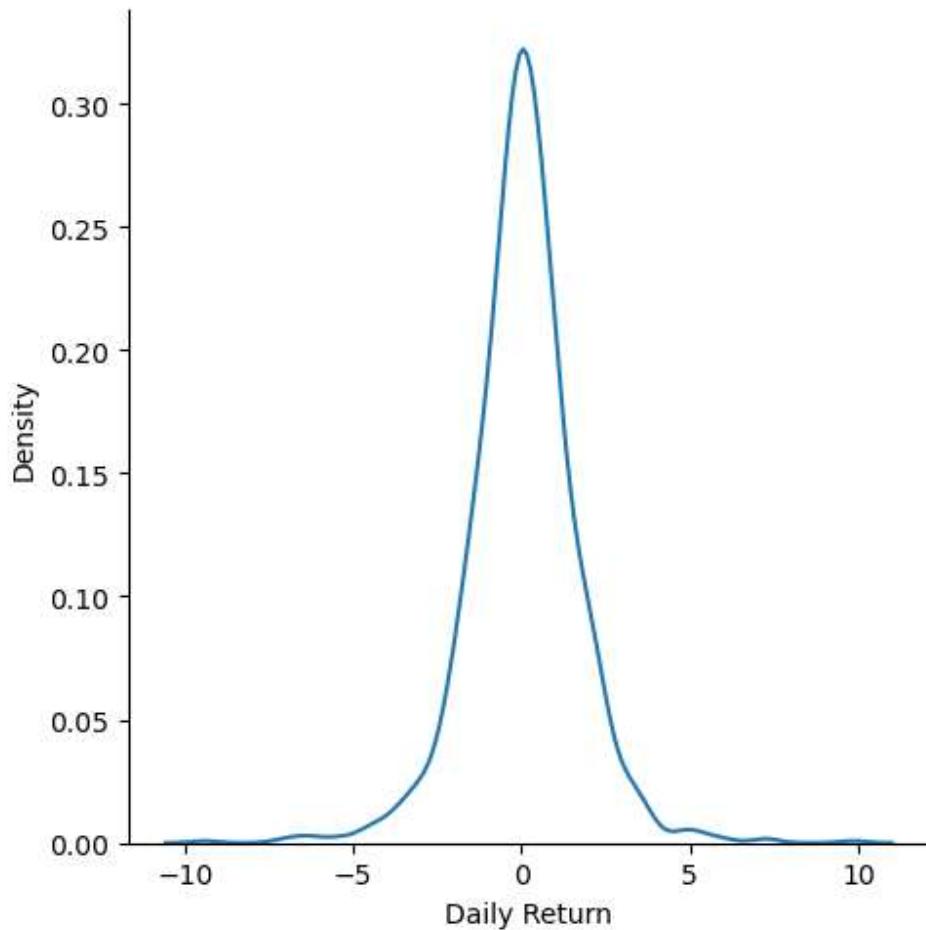
Invariably, the month of February has consistently yielded a negative daily average return.

Historically, the month of June has consistently exhibited a daily positive average return, except for the year 2022.

The months of March, April, September, and October tend to display significant fluctuations in returns, with either high negative returns or high positive returns. This volatility in these months could account for the observed patterns.

```
In [84]: sns.displot(data = fresh_data, x = "Daily Return", kind = "kde")
```

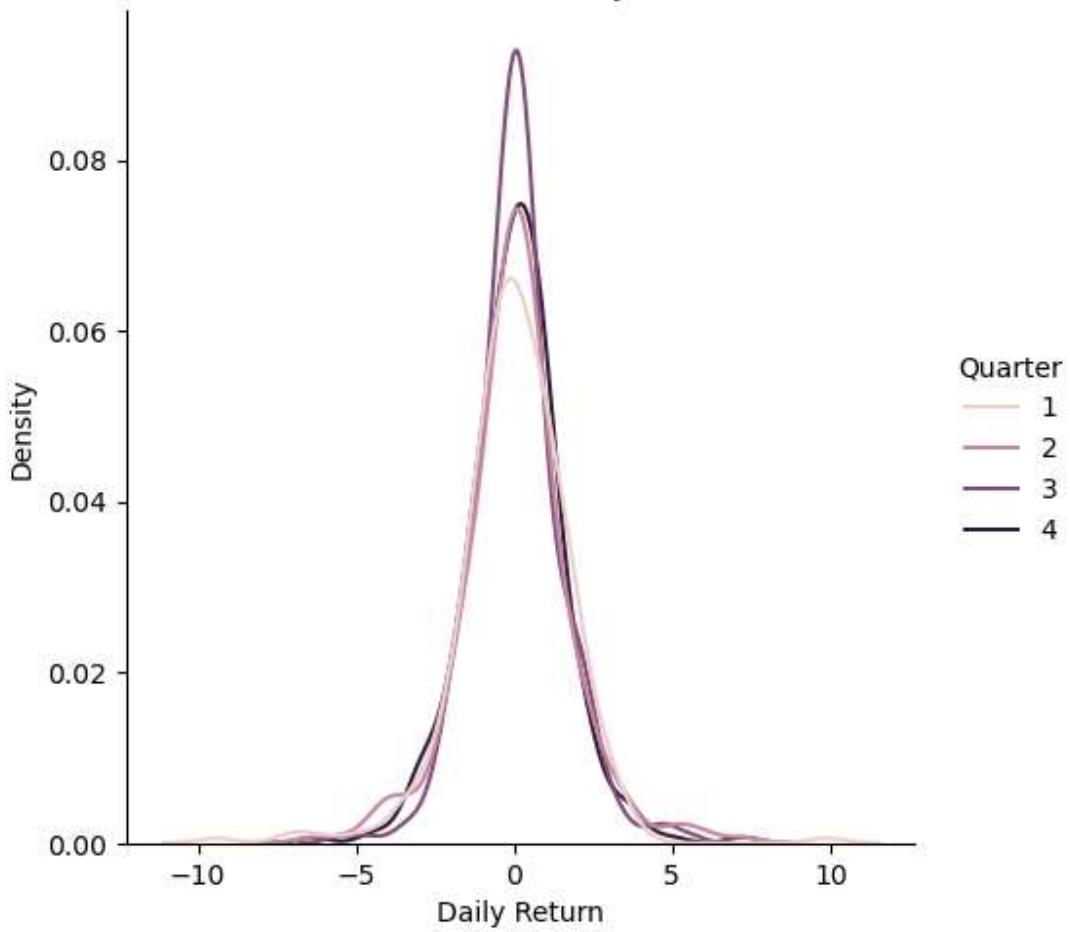
```
Out[84]: <seaborn.axisgrid.FacetGrid at 0x1a06d65d100>
```



```
In [93]: sns.displot(data = fresh_data, x = "Daily Return", kind = "kde", hue = "Quarter")
plt.title("Over The Past 5 years")
```

```
Out[93]: Text(0.5, 1.0, 'Over The Past 5 years')
```

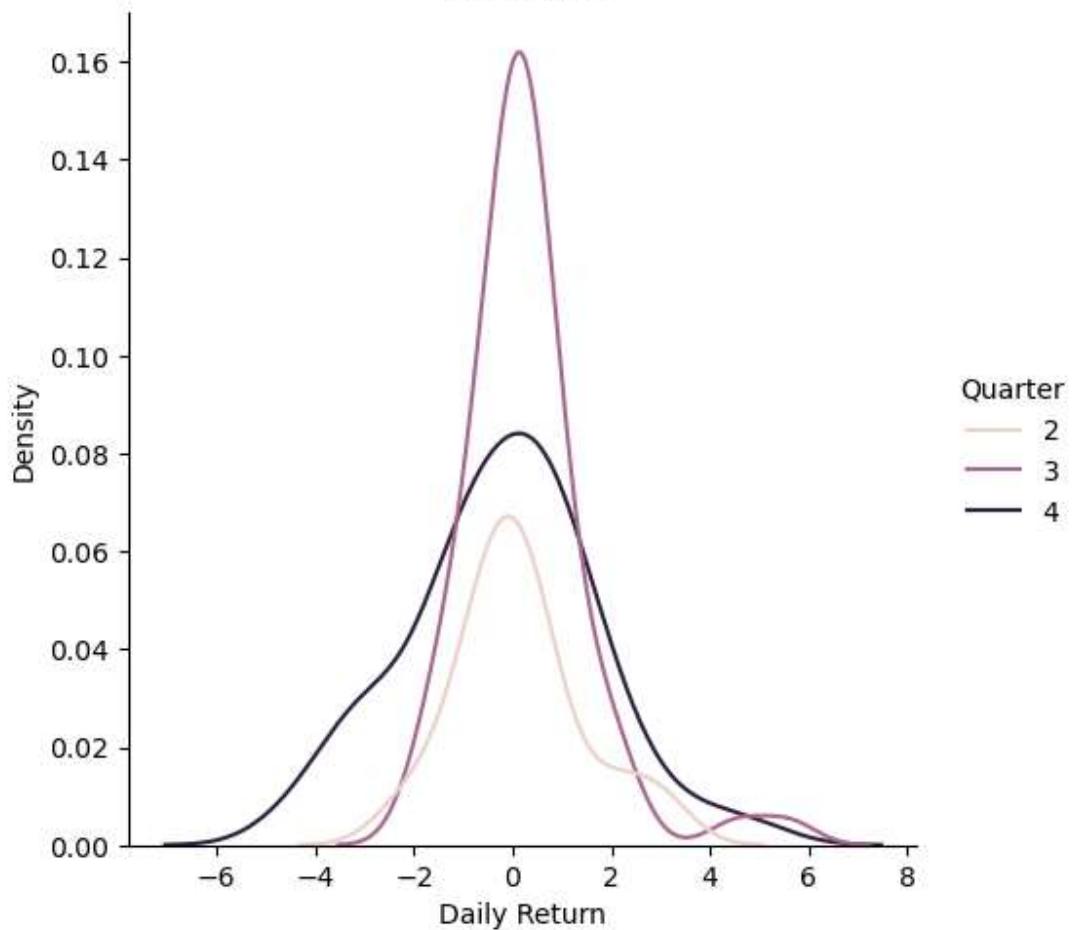
Over The Past 5 years



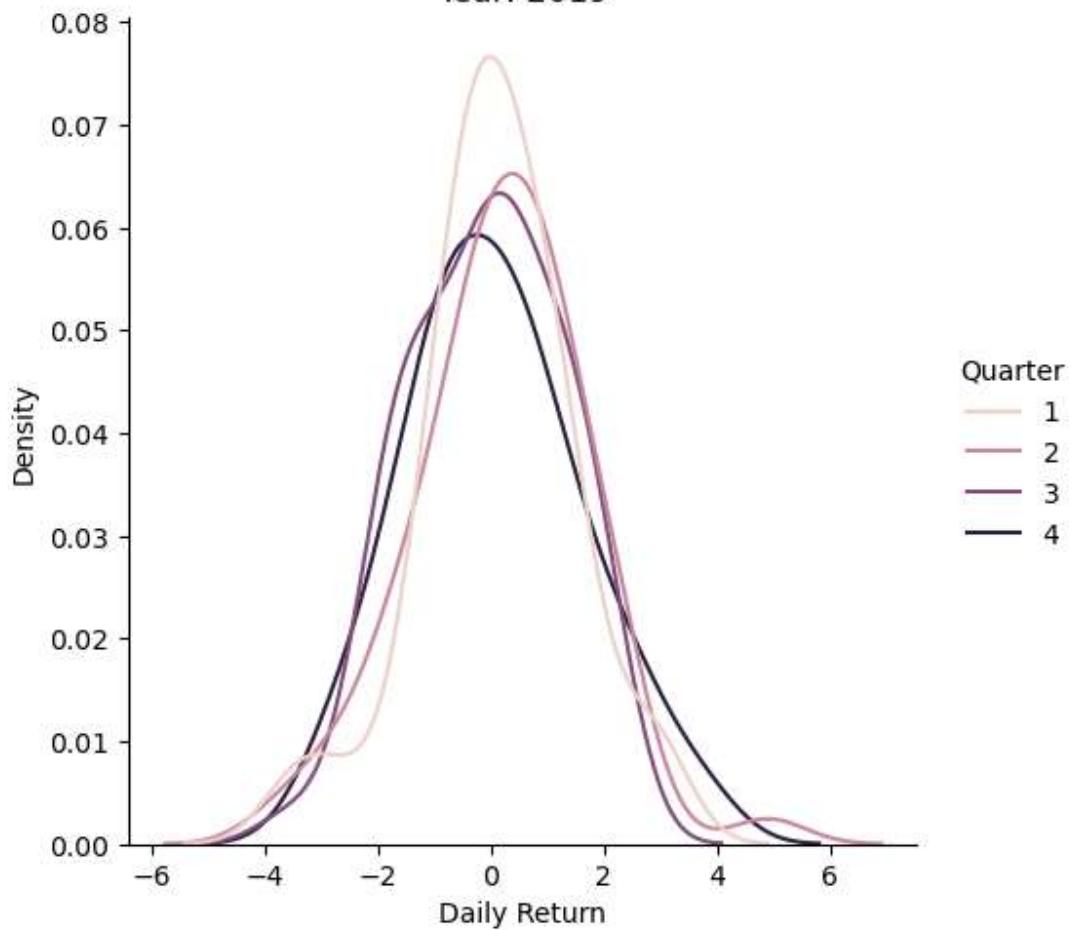
```
In [90]: for i in [2018, 2019, 2020, 2021, 2022, 2023]:
```

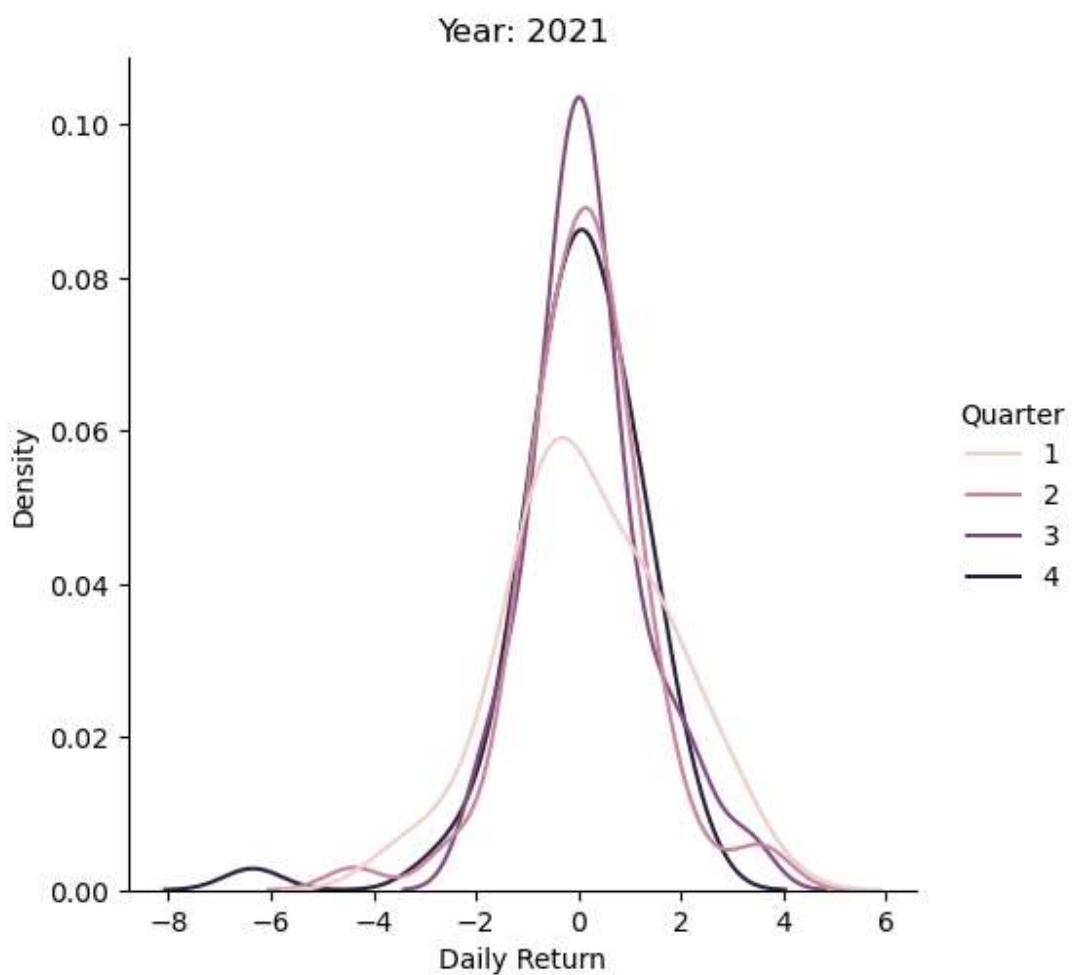
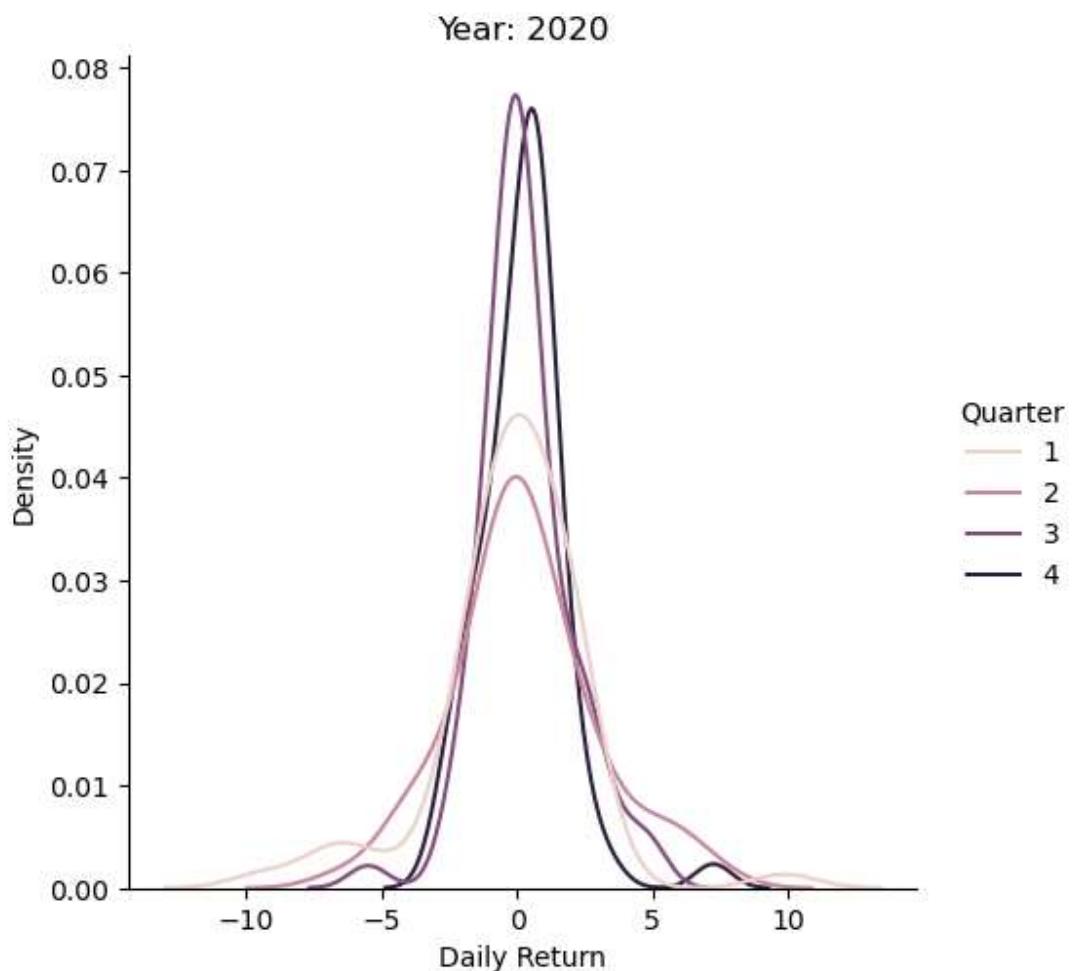
```
    sns.displot(data = fresh_data[fresh_data["Year"] == i], x = "Daily Return", kind = "kde")
    plt.title(f"Year: {i}")
    plt.show()
```

Year: 2018

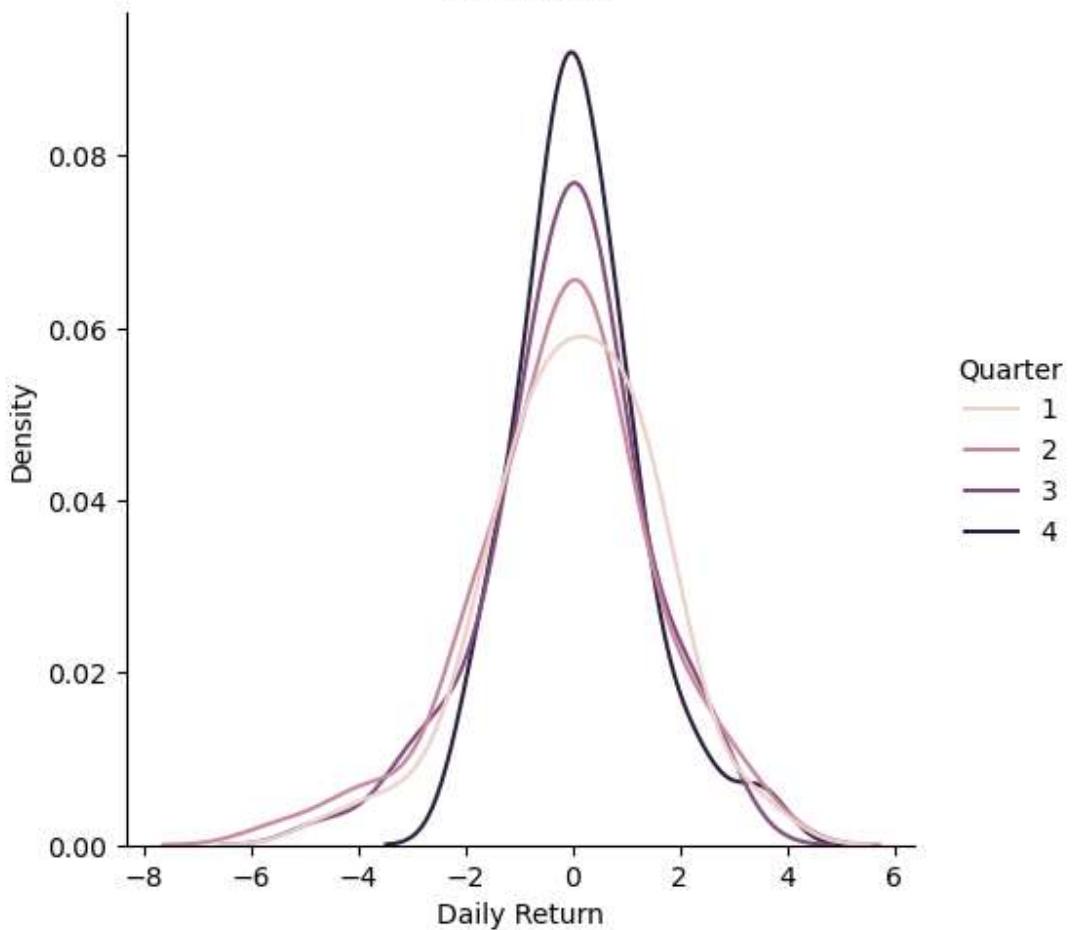


Year: 2019

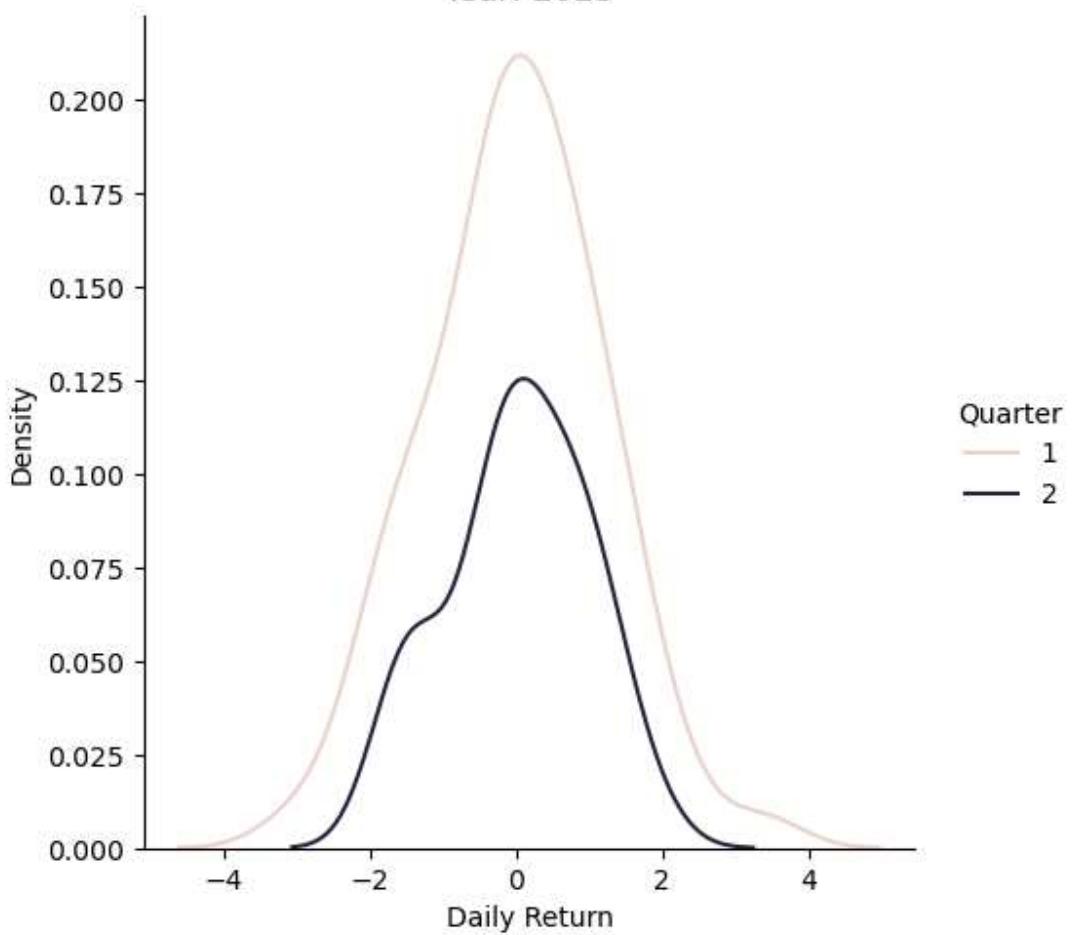




Year: 2022



Year: 2023

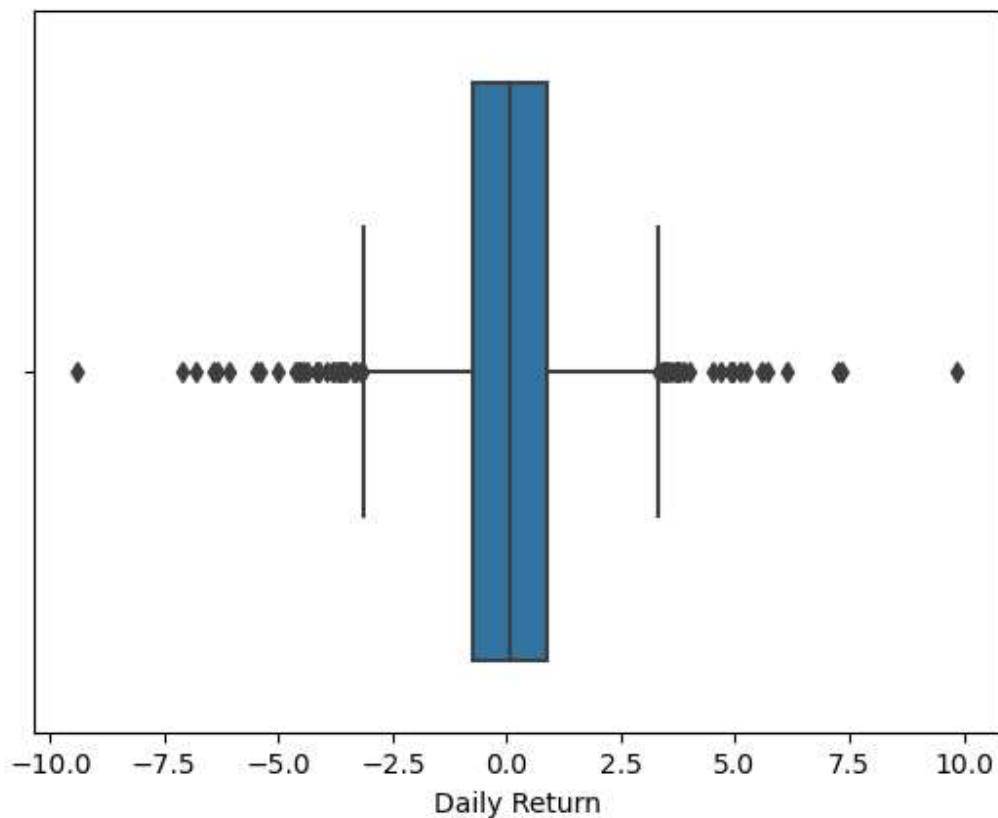


Observations:

The distribution of daily returns demonstrates a bell-shaped curve with a symmetrical pattern. This indicates that extremely high returns and extremely low returns are exceptional occurrences. The majority of days exhibit a daily return that is close to the average of all daily returns.

```
In [101... sns.boxplot(data= fresh_data, x = "Daily Return")
```

```
Out[101]: <AxesSubplot:xlabel='Daily Return'>
```



Observations:

The points located at the extremes of the box plot of the Daily Return are considered outliers. These outliers can be considered exceptional returns, as they deviate significantly from the majority of the data points within the distribution.

```
In [102... def get_outlier_range(data):
    q1 = np.quantile(data, 0.25)
    q3 = np.quantile(data, 0.75)
    iqr = q3 - q1
    return (q1 - 1.5*iqr, q3 + 1.5*iqr)
```

```
In [106... lb, ub = get_outlier_range(fresh_data['Daily Return'])
```

```
In [111... tcs_exceptional_return = fresh_data[((fresh_data['Daily Return'] > ub) | (fresh_data["Da
```

```
In [113... tcs_exceptional_return = tcs_exceptional_return["2022-01-01" : "2023-05-22"]
```

Below is the data of dates during which the TCS stock exhibited exceptional returns (positive and negative) between January 1, 2022, and May 21, 2023.

In [114]: tcs_exceptional_return

Out[114]:

	Date	Candle	Upper Wick	Body	Lower Wick	Close	Candle Length	Volume	Daily Return	Quarter	Year
Date											
2022-01-27	2022-01-27	RED	2.399902	81.750000	24.149902	3534.363281	108.299804	5718297	-3.20	1	2022
2022-02-22	2022-02-22	RED	17.899902	63.600098	16.399902	3473.491699	97.899902	5408531	-3.58	1	2022
2022-02-24	2022-02-24	RED	9.850098	72.350098	10.549804	3294.558105	92.750000	5039136	-4.55	1	2022
2022-02-25	2022-02-25	GREEN	9.250000	52.750000	6.000000	3409.908203	68.000000	2549723	3.50	1	2022
2022-04-18	2022-04-18	RED	0.000000	81.949951	5.550049	3416.978760	87.500000	3820792	-3.66	2	2022
2022-05-19	2022-05-19	RED	8.000000	135.050049	31.949951	3159.256104	175.000000	4642963	-5.42	2	2022
2022-05-25	2022-05-25	RED	0.000000	125.200196	13.599853	3088.590576	138.800049	3548046	-3.66	2	2022
2022-05-30	2022-05-30	GREEN	11.350098	78.250000	10.649902	3291.009277	100.250000	2094624	3.49	2	2022
2022-06-13	2022-06-13	RED	3.000000	70.399902	27.150147	3139.244141	100.550049	3030921	-4.18	2	2022
2022-07-11	2022-07-11	RED	18.850098	92.349853	7.800049	3036.084717	119.000000	6974600	-4.64	3	2022
2022-09-14	2022-09-14	RED	6.399902	14.600098	6.599853	3050.551025	27.599853	5090269	-3.37	3	2022
2022-10-04	2022-10-04	GREEN	6.850098	61.199951	6.949951	3021.955566	75.000000	2145875	3.56	4	2022
2022-11-11	2022-11-11	GREEN	25.650147	46.349853	14.550049	3250.113525	86.550049	3265394	3.44	4	2022
2023-01-09	2023-01-09	GREEN	7.050049	90.949951	7.850098	3254.033936	105.850098	2885060	3.38	1	2023

Finding out the reasons of the exceptional return

In [115]:

```
from newspaper import Article
from GoogleNews import GoogleNews
```

In [61]:

```
news_result = {
    "Date": [],
    "Exceptional Return": [],
    "News": [],
    "Summary": [],
    "Source": []
}
```

```

for index in tcs_exceptional_return.index:
    i = str(index).split("-")
    start = [i[1], i[2].split(" ")[0], i[0]]
    end = [i[1], str(int(i[2].split(" ")[0]) + 1), i[0]]
    start = "/".join(start)
    end = "/".join(end)
    if tcs_exceptional_return.loc[index, "Daily Return"] > 0:
        query = "Why TCS stock gave high return"
    else:
        query = "Why TCS Stock Fell?"

googlenews=GoogleNews(start=start,end=end, region="IND")
googlenews.search(query)
result=googlenews.result()
df=pd.DataFrame(result)
article = Article(df["link"][0])
article.download()
article.parse()
article.nlp()

news_result['Date'].append(tcs_exceptional_return.loc[index, "Date"])
news_result['Exceptional Return'].append(tcs_exceptional_return.loc[index, "Daily Re
news_result["News"].append(article.title)
news_result["Summary"].append(article.summary)
news_result["Source"].append(article.source_url)

```

In [121]: news_result2 = pd.DataFrame(news_result)

In [141]: pd.set_option("display.max_colwidth", None)

In [142]: news_result2

Out[142]:

	Date	Exceptional Return	News	Summary	Source
0	2022-01-27	-3.20	Market Highlights: Sensex falls 581 points, Nifty ends above 17,100 mark	Share/Stock Highlights: The topline equity indices on BSE and National Stock Exchange (NSE) trimmed most of their intraday losses and ended around 1 per cent lower on Thursday weighed by technology stocks amid weakness in the global market that declined as the US Federal Reserve's signal to steadily tighten policy soured global investor sentiment.\nExplained Understanding the potential impact of Fed rate hike on US and other economiesThe S&P BSE Sensex fell 581.21 points (1.00 per cent) to end at 57,276.94 while the broader Nifty 50 declined 167.80 points (0.97 per cent) to settle at 17,110.15.\nBoth the indices had opened over 1 per cent lower and slipped nearly 2.5 per cent in the intraday trade with the Sensex hitting a low of 56,439.36 while the Nifty touched 16,866.75.\nOn the Sensex pack, HCL Technologies, Tech Mahindra, Dr. Reddy's Laboratories, Wipro, Tata Consultancy Services (TCS) and Titan Company were the top losers of the day while Axis Bank, State Bank of India (SBI), Maruti Suzuki India, Kotak Mahindra Bank,	https://indianexpress.com

			Sun Pharmaceutical Industries and IndusInd Bank were the top gainers.\n(with inputs from agencies)	
1	2022-02-22	-3.58	Cadila Healthcare shares fall to 52-week low on DCGI nod to rival's Covid-19 vaccine	Cadila Healthcare stock fell to its 52-week low today after the Drugs Controller General of India (DCGI) cleared the COVID-19 vaccine of competitor Biological E against the company's own vaccine ZyCoV-D. Cadila Healthcare share hit a fresh low of Rs 355.7, falling 4.17% against the previous close of Rs 371.10 on BSE.\nCadila Healthcare share is trading lower than 5 day, 20 day, 50 day, 100 day and 200 day moving averages.\nEarlier, Cadila Healthcare and Bharat Biotech's Covaxin had received the regulator's emergency approval for use on young adults.\nOn August 20, 2021, Zydus Cadila's three-dose Covid vaccine ZyCoV-D received DCGI approval for emergency use authorization in both adults and children over 12 years.\nHowever, according to reports, Zydus Cadila's ZyCoV-D vaccine - approved last year is yet to be rolled out in the vaccination drive.
2	2022-02-24	-4.55	Bloody Thursday: Ukraine crisis sparks sell-off; Sensex, Nifty crack 5% each	Bloody Thursday: Ukraine crisis sparks sell-off; Sensex, Nifty crack 5% each\n23 min read .\nUpdated: 24 Feb 2022, 03:48 PM ISTPremium Stock market LIVE updates: Equities fell and oil prices jumped on Thursday after Russia's ground forces invaded Ukraine from several directions, encircling the country within hours of President Vladimir Putin announcing his decision to launch an assault.\n(File Photo: Reuters)
3	2022-02-25	3.50	Nifty ends above 16,600, Sensex rallies 1300 pts; all sectoral indices higher	Nifty ends above 16,600, Sensex rallies 1300 pts; all sectoral indices higher\n25 min read .\nUpdated: 25 Feb 2022, 03:52 PM ISTPremium Stock market today: A day after being hammered following Russia's invasion of Ukraine, India equity markets surged on Friday, with benchmarks Sensex and Nifty rising more than 2% each.
4	2022-04-18	-3.66	Sensex tanks 1172 pts, Nifty ends below 17,200; Infosys, HDFC twins top losers	Sensex tanks 1172 pts, Nifty ends below 17,200; Infosys, HDFC twins top losers\n19 min read .\nUpdated: 18 Apr 2022, 04:03 PM ISTPremium Market Closing: Indian indices shed around 2% on Monday amid weak global cues.\n(Hemant Mishra/Mint)
5	2022-05-19	-5.42	Sensex tumbles 1416 pts, Nifty ends below 15,850; ITC shines, TCS, Wipro bleed	Sensex tumbles 1416 pts, Nifty ends below 15,850; ITC shines, TCS, Wipro bleed\n24 min read .\nUpdated: 19 May 2022, 03:47 PM ISTPremium Market Closing: Indian indices lost around 2.6% on Thursday amid extremely negative global trends.\nPhoto: Hemant Mishra/Mint

			TCS, Wipro bleed		
6	2022-05-25	-3.66	Share Market update: Sensex falls 300 pts, Nifty below 16,050; Asian Paints, TCS top losers	During the day, the 30 stock index hit a low of 53,886.28 and a high of 54,524.37.\n3:30 pm: Sensex falls 303 points to 53,749 and Nifty ends 99 points lower at 16,025 in today's session.\n2:57 pm: Market updateSensex trading 306 points lower at 53,746 and Nifty loses 116 points to 16,008 in the afternoon session.\n1:22 pm: Indices turn redSensex trading 186 points lower at 53,865 and Nifty loses 60 points to 16,065 in the afternoon session.\nDuring the day, the 30 stock index hit a low of 53,886.28 and a high of 54,524.37.	https://www.businesstoday.in
7	2022-05-30	3.49	Sensex soars 1041 pts, Nifty ends above 16,650; M&M, Titan roar, IT stocks shine	Sensex soars 1041 pts, Nifty ends above 16,650; M&M, Titan roar, IT stocks shine26 min read .\nUpdated: 30 May 2022, 03:50 PM ISTPremium Market Closing: Indian indices ended strongly on Monday, rising close to 2% amid positive global cues (MINT_PRINT)	https://www.livemint.com
8	2022-06-13	-4.18	LIC loses over \$15 billion of investor wealth — fear of more losses as anchor lock-in ends	Share price of life insurance giant LIC has rolled down about 29% from its issue price amid a weak market phase.\nMoreover, the lock in period for anchor investors to not sell shares of the company ends today, which could fuel some selling.\nWith this, LIC's position has come down to become the seventh largest company from fifth earlier.\nIts biggest advantage is its dominant position in the market and its size also become its liabilities."LIC's dominant share in the single-premium group fund management business artificially inflates its market share and deflates some of its cost ratios.\nMoreover, its share in the high margin business is low and its future growth depends on how much of that – it can bag.	https://www.businessinsider.in
9	2022-07-11	-4.64	TCS Share Price: TCS shares crash 4.7% post subdued Q1 results	The TCS stock fell 4.70 per cent to end at Rs 3,112.00 apiece on the National Stock Exchange while on the BSE it declined 4.64 per cent to settle at Rs 3,113.25.\nDuring the session, it hit an intraday low of Rs 3,105.85 on the BSE and Rs 3,106.00 on the NSE.\nOn Monday, 69,74,600 shares of TCS were traded on the NSE and 2,02,015 shares exchanged hands on the BSE, data from the respective bourses showed.\nOn Friday, after the market hours, TCS reported a 5.2 per cent year-on-year rise in the April-June quarter (Q1) net profit at Rs 9,478 crore.\nWe remain positive on stock given its strong revenue growth, elevated EBIT margin and industry leading return ratios.	https://indianexpress.com
10	2022-	-3.37	TCS rating:	Mumbai: Goldman Sachs has downgraded	https://economictimes.indiatimes.com

	09-14	Goldman cuts ratings on TCS, Infosys and Tech Mahindra	its ratings on TCS Infosys and Tech Mahindra to 'sell' citing a sharp cut in dollar revenue growth forecast for the IT sector. The brokerage said the high share valuation of Information Technology (IT) companies do not factor in a 'material' revenue growth slowdown in FY24.\nIt however upgraded Wipro from 'sell' to 'buy'.\n"Given the upcoming macro slowdown (not recession), which is percolating down multiple leading demand indicators, we believe Indian IT sector's dollar revenue growth will start to materially slow down from here, weighing on the secular tailwinds," said Goldman in a note to clients.\nThe brokerage has retained its 'buy' rating on Mphasis and a neutral on HCL Technologies IT stocks slumped on Wednesday with the NSE IT index dropping 3.36% to 28,137.60.\nThe benchmark Nifty fell 0.4% but managed to close above the psychologically crucial 18,000-mark.		
11	2022-10-04	3.56	Sensex ends 1200 pts higher, Nifty adds 400 pts; all indices close in green	https://www.livemint.com	
12	2022-11-11	3.44	Sensex rises 809 points in early trade; Nifty above 18,000	November 11, 2022 10:45 am Updated 10:45 am IST - MumbaiEquity benchmark Sensex climbed 809.64 points in early trade on Friday, helped by heavy buying in IT counters amid a rally in global markets after encouraging US inflation data.\nThe 30-share BSE index was trading 809.64 points or 1.34% higher at 61,423.34 in initial deals.\nIn the previous session on Thursday, the 30-share BSE benchmark ended 419.85 points or 0.69% lower at 60,613.70.\nThe current US inflation data points to an early end of the interest rate hike cycle.\nThe rupee appreciated 64 paise to ₹80.76 against the U.S. dollar in early trade on Friday.	https://www.thehindu.com
13	2023-09-01	3.38	TCS Q3 Results: Profit rises 4% QoQ to Rs 10,846 crore, misses estimates	Some, in a Pavlovian response, rushed to buy gold; others spent the weekend pondering over the task at hand.\nThose who panicked never showed it, and almost everyone agreed that a visit to the bank was a bad idea.\nExperience Your Economic Times Newspaper, The Digital Way!\nFor fastest news alerts on financial markets, investment strategies and stocks alerts, subscribe to our Telegram feeds .\nDownload The Economic Times News App to get Daily Market Updates & Live Business News.	https://m.economictimes.com

I attempted to gather news about the days when TCS Stock experienced exceptional returns from Google News. The news was extracted from the first article that appeared on Google News. It's important to note that the information may not be entirely accurate, but it should provide a general understanding of why TCS Stock experienced exceptional returns on those particular days.

Analysing Correlation of TCS Stock with Competitors as well as Market Index

In [145...]

```
tcs = pd.read_csv("TCS.NS.csv")
infy = pd.read_csv("INFY.NS.csv")
nifty = pd.read_csv("NSEI.csv")
hcl = pd.read_csv("HCLTECH.NS.csv")
wipro = pd.read_csv("WIPRO.NS.csv")
nifty_it = pd.read_csv("NIFTY_IT.csv")

def format_data(data):
    data = data.copy()
    data["Date"] = pd.to_datetime(data["Date"])
    data.index = data['Date']
    data['Close'] = data["Adj Close"]
    data.drop(['Open', "High", "Low", "Adj Close", "Date"], axis = 1, inplace = True)
    data["Daily Return"] = 0
    first_time = True
    for i in data.index:
        if first_time:
            first_time = False
            previous_close = data.loc[i, "Close"]
        else:
            data.loc[i, "Daily Return"] = round((1 - data.loc[i, "Close"])/previous_close)
            previous_close = data.loc[i, "Close"]
    return data

tcs = format_data(tcs)
infy = format_data(infy)
nifty = format_data(nifty)
hcl = format_data(hcl)
wipro = format_data(wipro)
nifty_it = format_data(nifty_it)

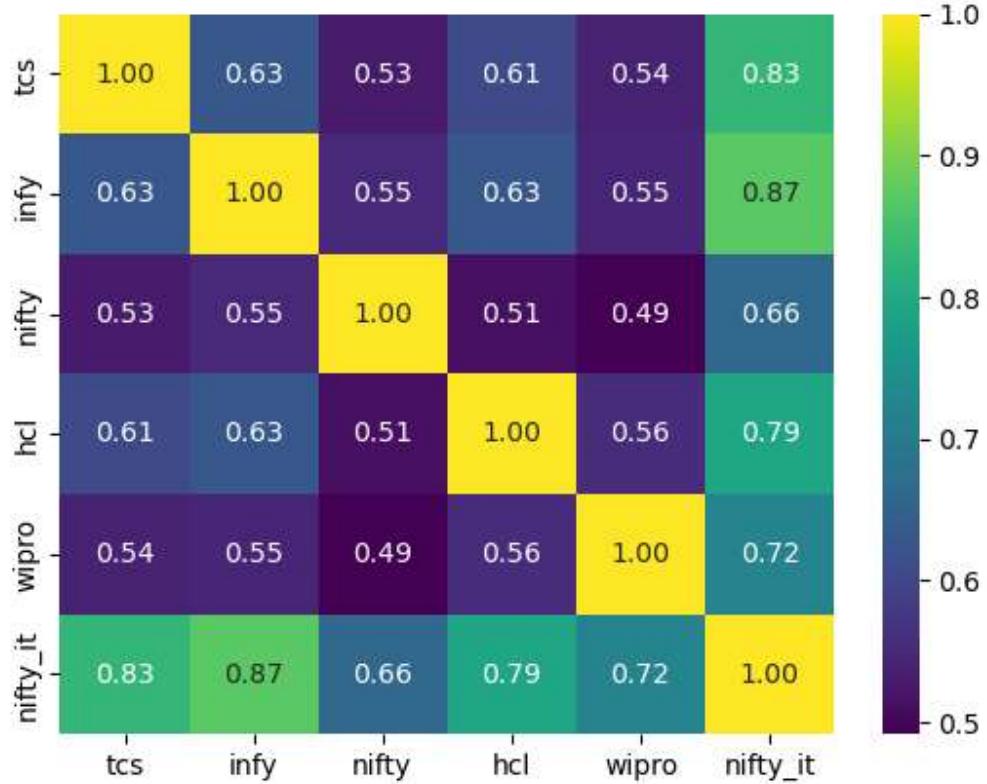
close_data = pd.DataFrame({
    "tcs" : tcs["Close"],
    "infy" : infy["Close"],
    "nifty" : nifty["Close"],
    "hcl" : hcl['Close'],
    "wipro" : wipro["Close"],
    "nifty_it" : nifty_it["Close"]
})

return_data = pd.DataFrame({
    "tcs" : tcs["Daily Return"],
    "infy" : infy["Daily Return"],
    "nifty" : nifty["Daily Return"],
    "hcl" : hcl["Daily Return"],
    "wipro" : wipro["Daily Return"],
    "nifty_it" : nifty_it["Daily Return"]
})
```

```
In [150]: plt.title("Correlation between Daily Close of Major IT Stocks and Market Index\n")  
sns.heatmap(return_data.corr(), annot = True, cmap = "viridis", fmt="1.2f")
```

```
Out[150]: <AxesSubplot:title={'center':'Correlation between Daily Close of Major IT Stocks and Market Index\n'}>
```

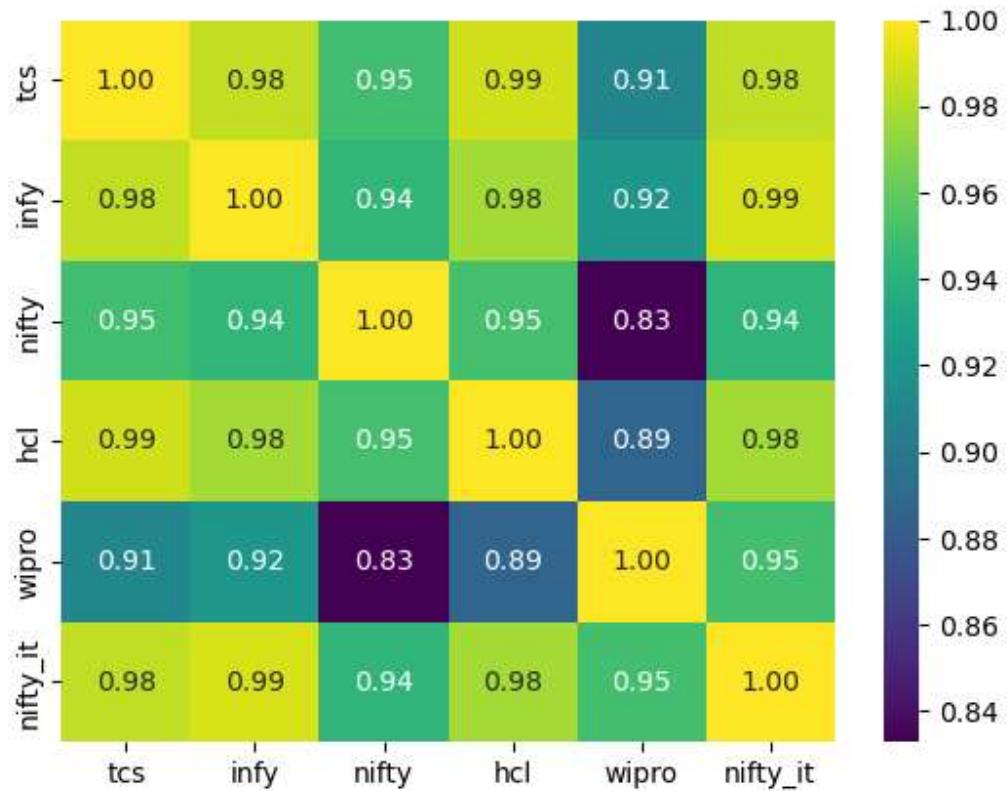
Correlation between Daily Close of Major IT Stocks and Market Index



```
In [156]: plt.title("Correlation between Daily Average Return of Major IT Stocks and Market Index\n")  
sns.heatmap(close_data.corr(), annot = True, cmap = "viridis", fmt="1.2f")
```

```
Out[156]: <AxesSubplot:title={'center':'Correlation between Daily Average Return of Major IT Stocks and Market Index\n'}>
```

Correlation between Daily Average Return of Major IT Stocks and Market Index



Observations:

It is evident that there is a high degree of correlation among various tech companies as well as the market index. However, it is interesting to note that Wipro exhibits the lowest correlation with other IT stocks.