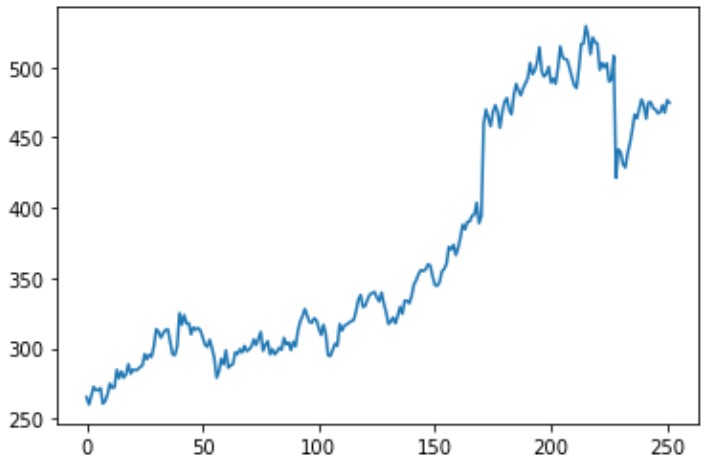
META PROJECT ANALYSIS

```
[21]: meta.loc[0:251 ,"Open"].plot()#display the open prices varying throughout an entire year
```

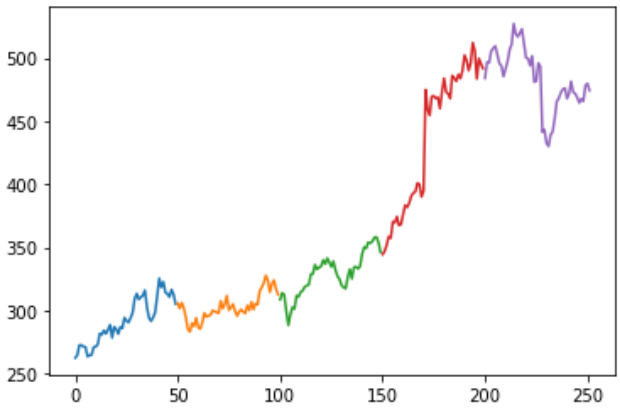
```
[21]: <AxesSubplot:>
```



The open prices of META stock show noticeable trends over the year. These trends can reflect broader market conditions, company-specific news, or macroeconomic factors. The open prices may show seasonal patterns, such as increased volatility during earnings seasons or major financial announcements. The open price analysis provides insights into how the stock market perceives the value of META at the start of each trading day. By analyzing these prices, investors can gain a better understanding of the stock's performance and the factors influencing its price.

```
In [22]: # Visualizing varying of closing price of stocks
         meta.loc[0:49,"Close"].plot()#from 5/30/2023 to 7/18/2023
         meta.loc[50:99,"Close"].plot()#from 8/10/2023 to 9/28/2023
         meta.loc[100:149,"Close"].plot()#from 9/29/2023 to 1/3/2024
         meta.loc[150:199,"Close"].plot()#from 1/4/2024 to 2/22/2024
         meta.loc[200:251,"Close"].plot()#from 2/23/2024 to 4/13/2024
```

```
Out[22]: <AxesSubplot:>
```



The time series plot of the close prices shows the variation throughout the year. We can observe general upward or downward trends in the close prices over time. These trends can indicate periods of sustained performance or decline. Specific peaks and troughs in the close price often coincide with major company announcements, product launches, or changes in market conditions. By analyzing the close prices, investors can gain a better understanding of the stock's performance over time and make informed decisions based on observed trends and volatility.

```
In [31]: meta["Direction"]=[1 if meta.loc[ei,"Price DIFF"]>0 else -1 for ei in meta.index]
```

```
In [32]: meta.head()
```

Out[32]:

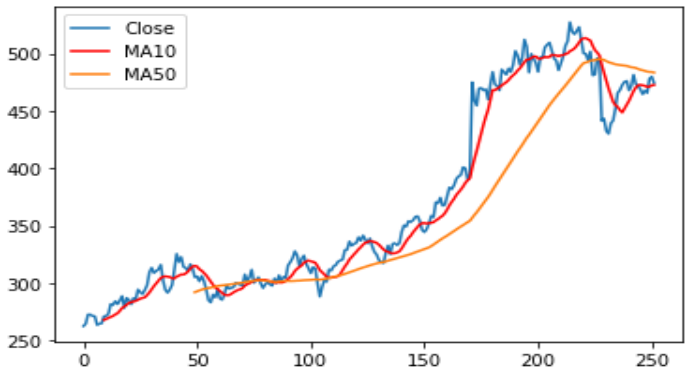
	Date	Open	High	Low	Close	Adj Close	Volume	Price	Price DIFF	Return	Direction
0	2023-05-30	265.250000	268.649994	261.290009	262.519989	262.241760	23816500	264.720001	2.200012	0.008380	1
1	2023-05-31	260.000000	265.000000	258.450012	264.720001	264.439423	25473700	272.609985	7.889984	0.029805	1
2	2023-06-01	265.899994	274.000000	265.890015	272.609985	272.321045	25609500	272.609985	0.000000	0.000000	-1
3	2023-06-02	272.660004	275.350006	271.119995	272.609985	272.321045	19405300	271.390015	-1.219970	-0.004475	-1
4	2023-06-05	270.299988	275.570007	269.559998	271.390015	271.102356	20742900	271.119995	-0.270020	-0.000995	-1

Here that we calculated and add the new columns to original data base which are “Price” and “Price DIFF” using python codes. The “Price” contained that the tomorrow price of close price and “Price DIFF” contain me ["Price DIFF"]=["Price"]-["Close"]. Consider about the “Return” column that calculated by ["Return"]=["Price DIFF /Close"]. Here we give the direction to the return according to the condition that “Price DIFF”>0 comment 1 and “Price DIFF”<0 comment that -1.

```
In [35]: meta["MA10"]=meta["Close"].rolling(10).mean()
         meta["MA50"]=meta["Close"].rolling(50).mean()
```

```
In [36]: meta["Close"].plot(legend=True)
         meta["MA10"].plot(color="red",legend=True)
         meta["MA50"].plot(legend=True)
```

Out[36]: <AxesSubplot:>



The above graph show us the moving average of close price of stocks can be how to varying. The moving average of 10 days and the moving average of 50 days we are taken to analysis.

- *For the 10-day moving average, sum up the closing prices of the last 10 days and divide by 10.*
- *For the 50-day moving average, sum up the closing prices of the last 50 days and divide by 50.*

Repeat this calculation and after that we plot the graph using python. Consider in overall situation by the time increase the moving average also get the upward trend. A crossover where the 10-day moving average crosses above the 50-day moving average is often interpreted as a bullish signal, indicating potential upward momentum. Conversely, a crossover where the 10-day moving average crosses below the 50-day moving average is considered a bearish signal, suggesting potential downward momentum. Analyze the slope of each moving average. A steeply rising moving average indicates strong momentum in the corresponding direction that is MA50 and that MA10 shows the weaker trend.

```
In [37]: meta["shares"]=[1 if meta.loc[ei,"MA10"]>meta.loc[ei,"MA50"] else 0 for ei in meta.index]# evaluate shares
         # 1 indiacte the points where the MA10 crosses above the MA50 can be potential buy signals,
         # 0 indicate the MA10 crosses below the MA50, it can be potential sell signals.

In [38]: meta.iloc[170:230,:]
```

	Date	Open	High	Low	Close	Adj Close	Volume	Price	Price DIFF	Return	Direction	Average 3	MA10	MA50	shares
170	2024-02-01	393.940002	400.500000	393.049988	394.779999	394.361572	29727100	474.989990	80.209991	0.203176	1	394.993337	391.445004	354.312001	1
171	2024-02-02	459.600006	485.959991	453.010010	474.989990	474.486542	84615500	459.410004	-15.579986	-0.032801	-1	419.970001	400.599002	357.012401	1
172	2024-02-05	469.880005	471.899994	459.220001	459.410004	458.923065	40832400	454.720001	-4.690003	-0.010209	-1	443.059998	408.362003	359.461001	1
173	2024-02-06	464.000000	467.119995	453.000000	454.720001	454.238037	21655200	469.589996	14.869995	0.032701	1	463.039998	415.314002	361.725601	1
174	2024-02-07	458.000000	471.519989	456.179993	469.589996	469.092285	23066000	470.000000	0.410004	0.000873	1	461.240000	423.203000	364.352801	1
175	2024-02-08	468.320007	470.589996	465.029999	470.000000	469.501862	18815100	468.109985	-1.890015	-0.004021	-1	464.769999	430.885001	367.058801	1
176	2024-02-09	472.950012	473.589996	467.470001	468.109985	467.613831	18413100	468.899994	0.790009	0.001688	1	469.233327	438.281998	369.641201	1

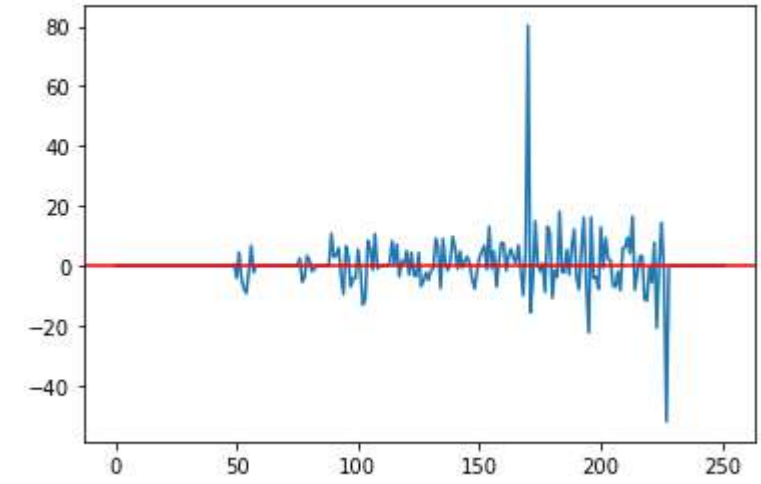
Here that add the new column that “shares”. that help to investors to taking the right decision and avoid the risk and mange the risk of investment. The condition of the “shares” column is “MA10(moving average of 10days)> MA50(moving average of 50)” comment that as :1” and others as “0”.

- 1 indicate the points where the MA10 crosses above the MA50 can be potential buy signals.
- 0 indicate the MA10 crosses below the MA50, it can be potential sell signals.
-

e	Volume	Price	Price DIFF	Return	Direction	Average 3	MA10	MA50	shares	Profit	Wealth
9	10078600	465.779999	-2.000000	-0.004276	-1	467.083333	471.941007	484.905402	0	0.0	105.260009
9	11747900	478.220001	12.440002	0.026708	1	466.063334	470.977005	484.309602	0	0.0	105.260009
1	12012300	479.920013	1.700012	0.003555	1	470.593333	471.179004	484.037402	0	0.0	105.260009
3	10175800	474.359985	-5.560028	-0.011585	-1	474.640004	472.370004	483.953802	0	0.0	105.260009
5	9208600	NaN	NaN	NaN	-1	477.500000	472.621002	483.501402	0	0.0	105.260009

Here that we add another two columns that are “Profit” and “Wealth”. The profit calculated for each row in the "meta" based on the price difference between the "Price" and "Close" columns, but only includes the profit if the value in the "shares" column is equal to 1.”wealth” that calculated by the summation of the “profit” column in day by day. Below give graphs are shows the varying of “Profit” and “wealth”.

```
<matplotlib.lines.Line2D at 0x1cce32b6970>
```

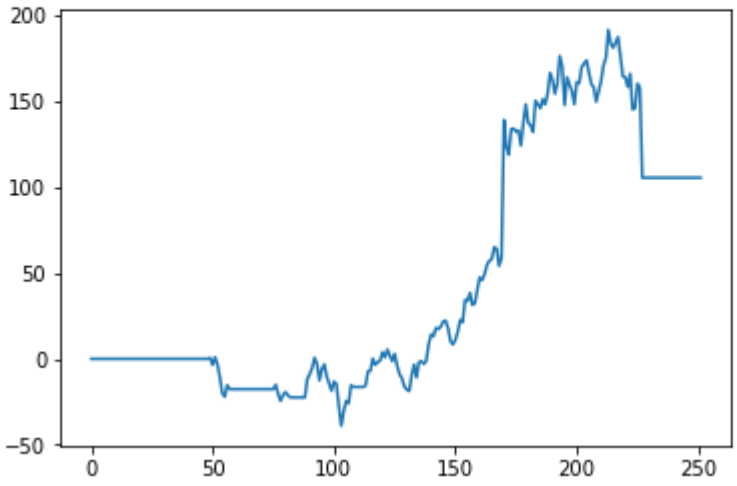


This above graph shows the how the “Profit” varying through the year and below the 0 horizontal axis shows the loss of money in that periods. This helpful for investors to identify their profit margin days in entire year. There is huge profit margin during the 1st two moths of 2024 according to graph.

```
]: meta["Wealth"]=meta["Profit"].cumsum()# calculate wealth

]: meta["Wealth"].plot()

]: <AxesSubplot:>
```



The above give graph shows the how varying about the “wealth” by cumulating the “profit” day by day.IN the 1st 50 days there is 0 wealth according to our condition. But after that there is upward trend and the wealth is gaining at during the 3rd and 4th months in 2024.

- Log return, also known as logarithmic return or continuously compounded return, is a way to measure the rate at which an investment grows or declines over time. It is often preferred in finance because of its mathematical properties and its interpretation in terms of percentage changes.

The formula for calculating the log return R for an investment over a period of time is:

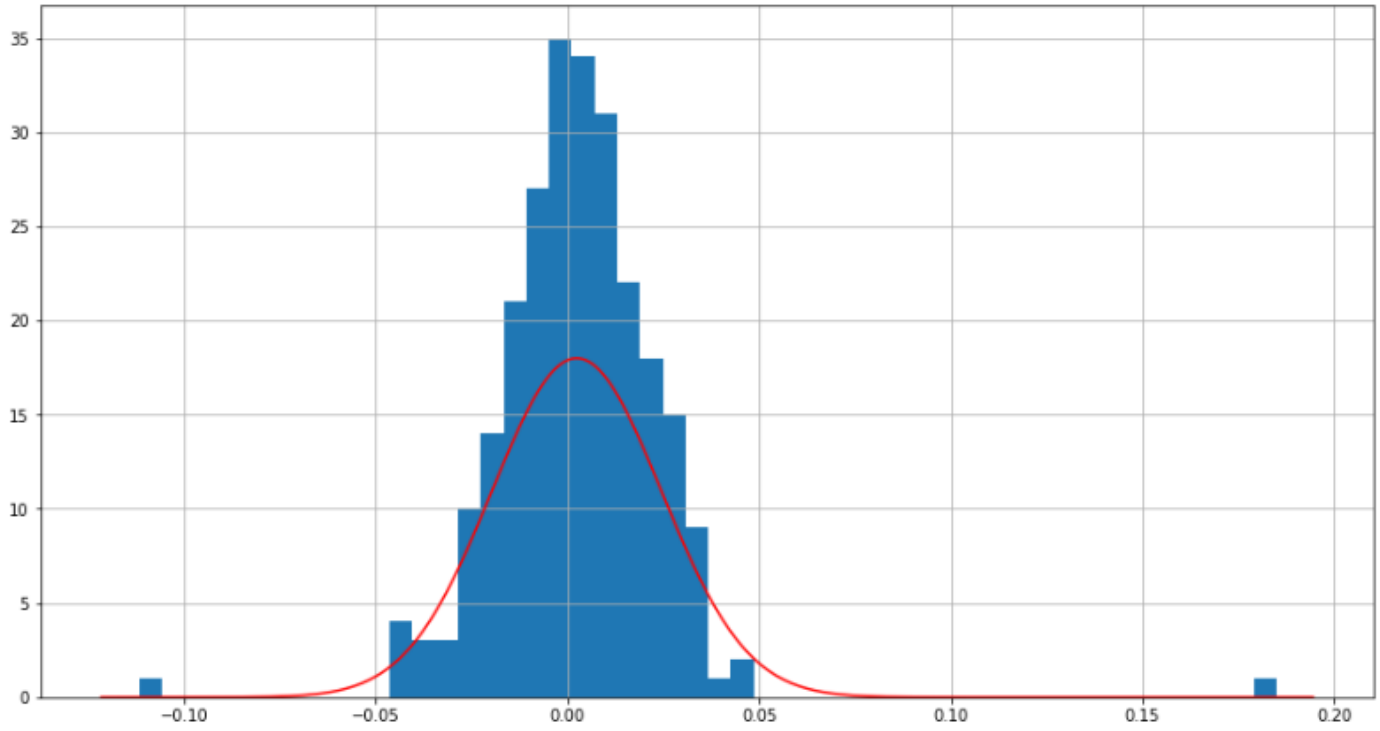
- ***R=ln(Pt/Pt-1)***
- Pt is the price of the investment at time t.
- Pt−1 is the price of the investment at the previous time period.

MA10	MA50	shares	Profit	Wealth	LogReturn
471.941007	484.905402	0	0.0	105.260009	-0.004285
470.977005	484.309602	0	0.0	105.260009	0.026357
471.179004	484.037402	0	0.0	105.260009	0.003549
472.370004	483.953802	0	0.0	105.260009	-0.011653
472.621002	483.501402	0	0.0	105.260009	NaN

Here we add the daily log return of the stocks using the python code which is {meta["LogReturn"] = np.log(meta["Close"].shift(-1)) - np.log(meta["Close"])} the below give graph shows the distribution of daily log return by using histogram and standard curve.

```
plt.show()

#Plot the histrogram to show the distribution of long return of META stocks
#We can see it is very close to a norml distribution
```



We can see it is very close to a normal distribution.