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INTRODUCTION

- This dataset is scraped from the <u>Alpha Vantage API</u> which provides real-time and historical data of stock market prices.
- I scraped the data in Python using the Alpha Vantage API.
- In data scrapping, Symbol which is used is "APPL"
- "AAPL", is the stock symbol for Apple Inc., an American multinational technology company that designs, develops, and sells consumer electronics, computer software, and online services.
- Tools that I used during this analysis are Python and Excel.

A GLANCE OF THE DATASET

- This real-time dataset is comprised of 5 months from Mar-2023 to July 2023. It has 6 variables date, open, high, low, close, and volume.
- Variables for Apple stock market under NASDAQ, we can define in the following way:
- Open: The opening price of AAPL stock on a given trading day
- High: The highest price that AAPL stock reached on a given trading day
- Low: The lowest price that AAPL stock reached on a given trading day
- Close: The closing price of AAPL stock on a given trading day
- Volume: The total number of shares of AAPL stock that were traded on a given trading day on NASDAQ

Date	*	Open 💌	High ▼	Low	Close 💌	Volume
27/07/20	23	196.02	197.2	192.55	193.22	474601
26/07/20	23	193.67	195.64	193.32	194.5	474718
25/07/20	23	193.33	194.44	192.915	193.62	372832
24/07/20	23	193.41	194.91	192.25	192.75	455050
21/07/20	23	194.1	194.97	191.23	191.94	719516
20/07/20	23	195.09	196.47	192.495	193.13	595811
19/07/20	23	193.1	198.23	192.65	195.1	805073
18/07/20	23	193.35	194.33	192.415	193.73	483537
17/07/20	23	191.9	194.32	191.81	193.99	505201
14/07/20	23	190.23	191.1799	189.63	190.69	416162
13/07/20	23	190.5	191.19	189.78	190.54	413423
12/07/20	23	189.68	191.7	188.47	189.77	607502
11/07/20	23	189.16	189.3	186.6	188.08	466383
10/07/20	23	189.26	189.99	187.035	188.61	599223
07/07/20	23	191.41	192.67	190.24	190.68	468149
06/07/20	23	189.84	192.02	189.2	191.81	451560
05/07/20	23	191.565	192.98	190.62	191.33	469202
03/07/20	23	193.78	193.88	191.76	192.46	314581
30/06/20	23	191.63	194.48	191.26	193.97	852132
29/06/20	23	189.08	190.07	188.94	189.59	463473
28/06/20	23	187.93	189.9	187.6	189.25	512168
27/06/20	23	185.89	188.39	185.67	188.06	507308
26/06/20	23	186.83	188.05	185.23	185.27	480886
23/06/20	23	185.55	187.56	185.01	186.68	531169
22/06/20	23	183.74	187.045	183.67	187	512453
21/06/20	23	184.9	185.41	182.5901	183.96	495156

THE APPROACH USED FOR ANALYSIS

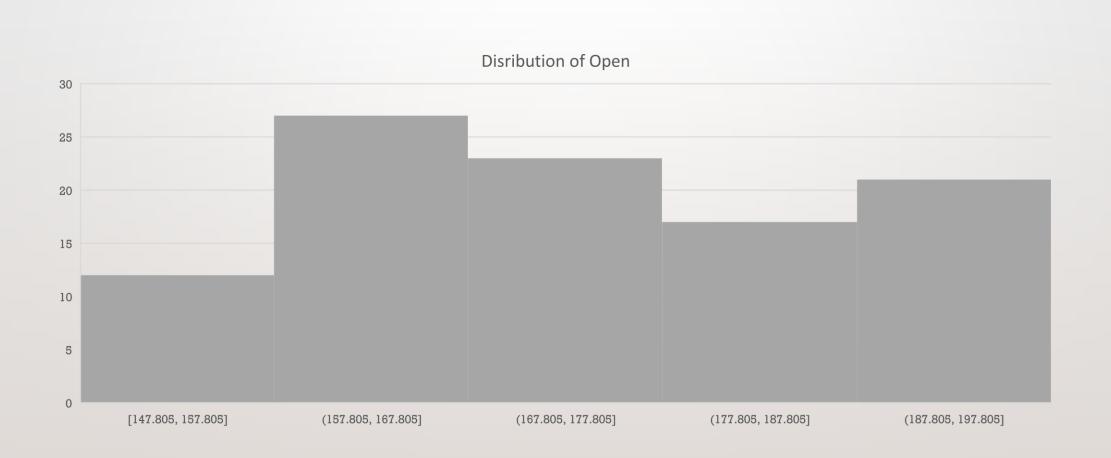
We will explore the dataset by using the following approach:

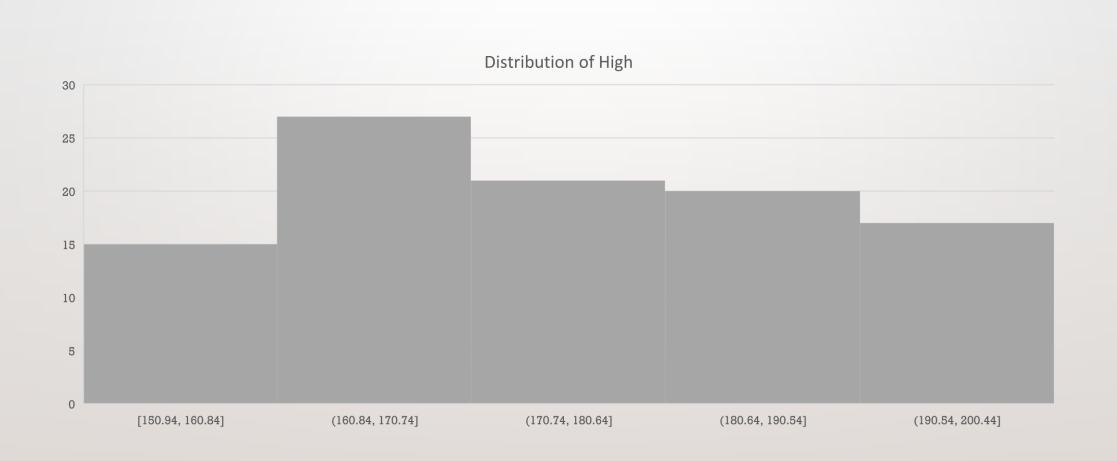
- Descriptive Statistics
- Distribution of Variables
- Correlation between Variables
- Visual representation of the correlation between variables
- Trend analysis of time-series data
- · Pivot table for examining the average open, high, low, close, and volume
- Hypothesis Testing

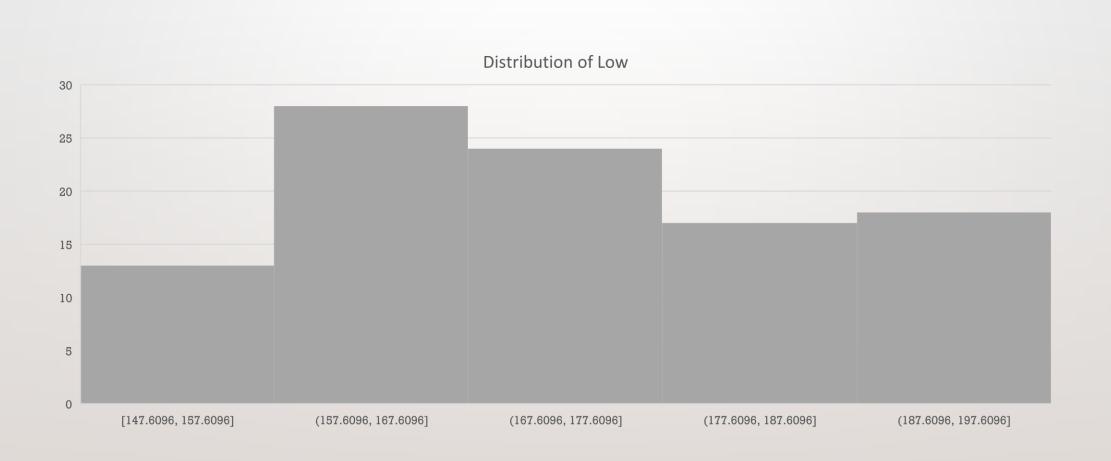
DESCRIPTIVE STATISTICS

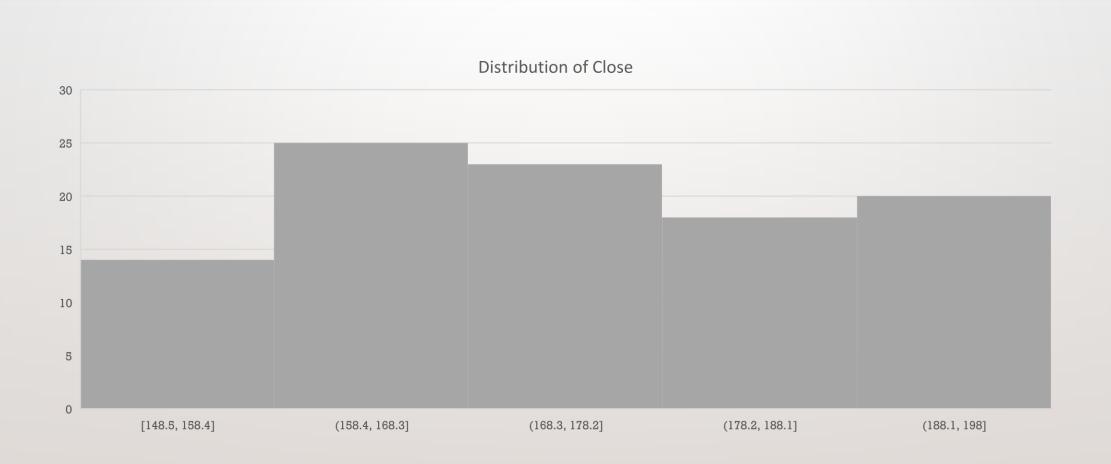
- Apple product's average opening price is \$173, minimum opening price is \$148 and maximum opening price is \$195
- Apple product's average high price is \$173, minimum high price is \$148 and maximum high price is \$195
- Apple product's average low price is \$172, minimum opening price is \$148 and maximum opening price is \$193
- Apple product's average closing price is \$173, minimum closing price is \$148 and maximum closing price is \$195
- Apple product's average number of shares is 58M, minimum share is 31M and maximum share is 121M

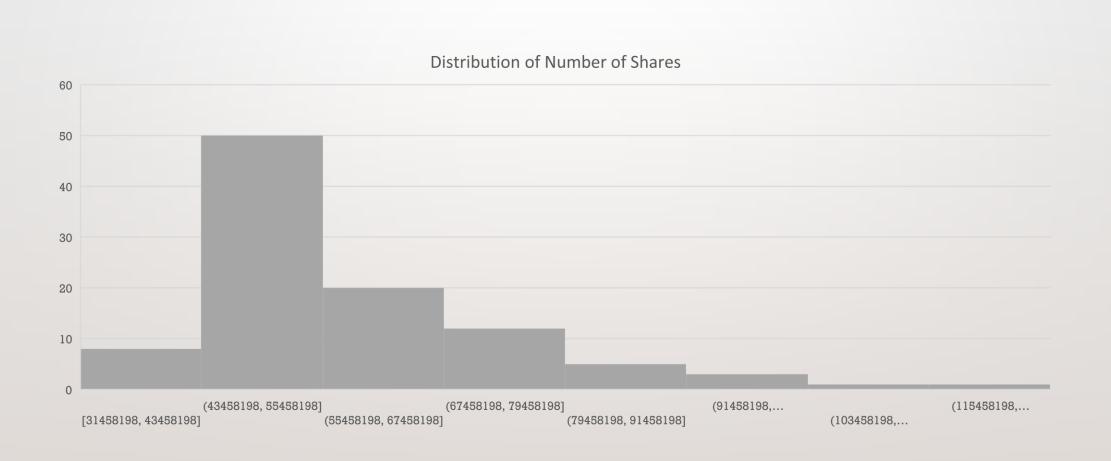
Opening Pric	е	High Price		Low Price		Closing Pri	ice	Number of :	Shares
Mean	173.27	Mean	173.27	Mean	172.17	Mean	173.61803	Mean	58022825.93
Standard Error	1.3152	Standard Error	1.3152	Standard Error	1.3188	Standard Error	1.3109009	Standard Error	1629280.302
Median	173	Median	173	Median	171.6	Median	172.69	Median	52472936
Mode	165.19	Mode	165.19	Mode	#N/A	Mode	172.07	Mode	#N/A
Standard Deviation	13.086	Standard Deviation	13.086	Standard Deviation	13.122	Standard Deviation	13.043299	Standard Deviation	16211134.32
Sample Variance	171.24	Sample Variance	171.24	Sample Variance	172.18	Sample Variance	170.12766	Sample Variance	2.62801E+14
Kurtosis	-1.124	Kurtosis	-1.124	Kurtosis	-1.1	Kurtosis	-1.112793	Kurtosis	3.19914486
Skewness	0.0238	Skewness	0.0238	Skewness	0.0047	Skewness	0.0102954	Skewness	1.652459622
Range	47.285	Range	47.285	Range	45.71	Range	46.6	Range	90488299
Minimum	147.81	Minimum	147.81	Minimum	147.61	Minimum	148.5	Minimum	31458198
Maximum	195.09	Maximum	195.09	Maximum	193.32	Maximum	195.1	Maximum	121946497
Sum	17153	Sum	17153	Sum	17045	Sum	17188.185	Sum	5744259767
Count	99	Count	99	Count	99	Count	99	Count	99











CORRELATION BETWEEN VARIABLES

- There is a very strong positive correlation between the "Open", "High", "Low", and "Close" columns, with correlation coefficients ranging from 0.993 to 0.997.
- This suggests that these variables are highly related to each other and tend to move in the same direction.

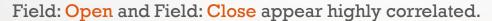
	Open	High	Low	Close	Volume
Open	1				
High	0.9966	1			
Low	0.9976	0.9972	1		
Close	0.993	0.9965	0.9973	1	
Volume	-0.196	-0.16	-0.204	-0.185	1

CORRELATION BETWEEN VARIABLES

- We can see that there is a weak negative correlation between the "Volume" column and the other columns, with correlation coefficients ranging from -0.16 to -0.2.
- This suggests that there is a weak relationship between the volume of trades and the stock prices. It means changes in trading volume don't have as much of an impact on the stock prices.

	Open	High	Low	Close	Volume
Open	1				
High	0.9966	1			
Low	0.9976	0.9972	1		
Close	0.993	0.9965	0.9973	1	
Volume	-0.196	-0.16	-0.204	-0.185	1

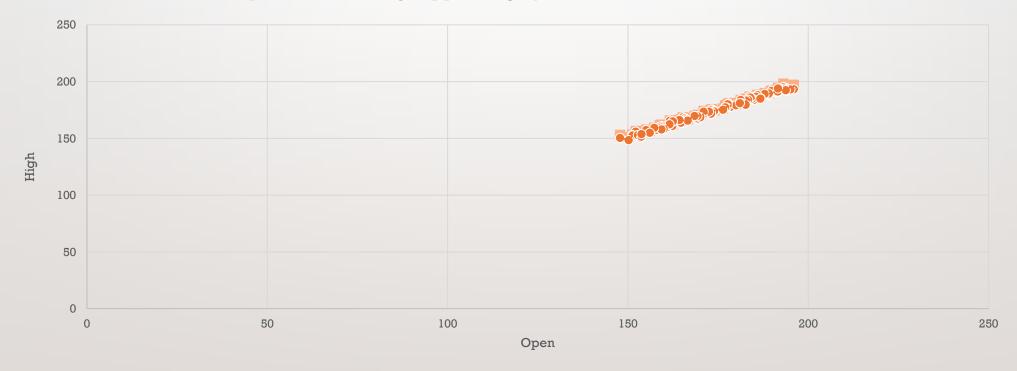
VISUAL REPRESENTATION OF CORRELATION



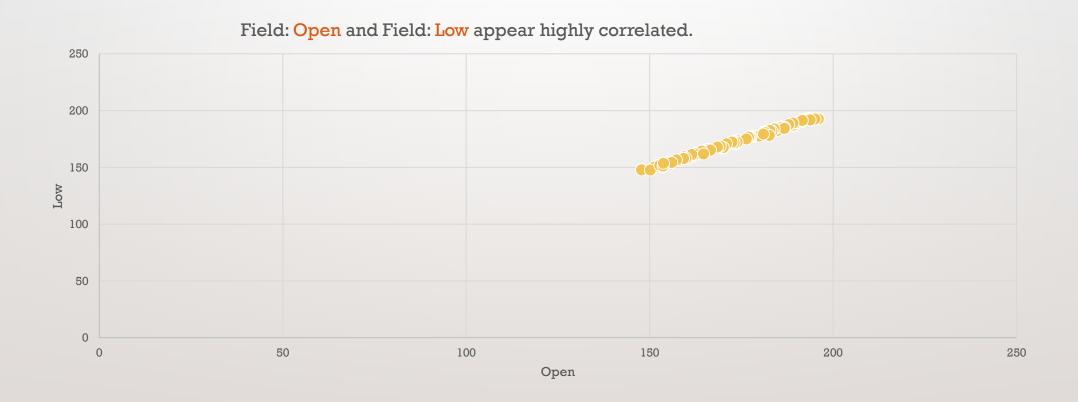


VISUAL REPRESENTATION OF CORRELATION





VISUAL REPRESENTATION OF CORRELATION



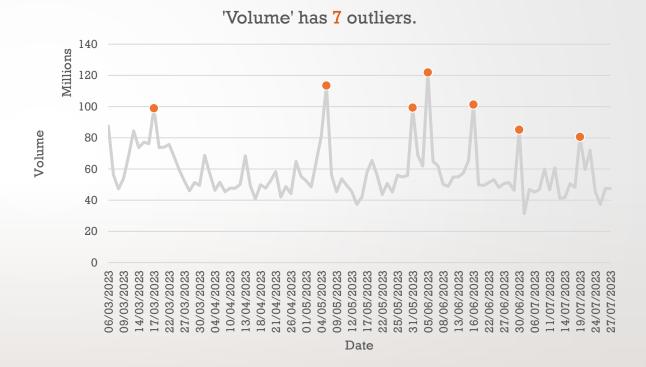
TREND ANALYSIS OF TIME-SERIES DATA

There is an increasing trend in stock prices of Apple products from Mar-2023 to July 2023



TREND ANALYSIS OF TIME-SERIES DATA

The majority number of shares which is volume is in the range from 43M to 80M.



PIVOT TABLE FOR EXAMINING AVERAGE PRICES AND VOLUME

- In Mar-2023 average prices are between \$156-\$158 and shares are 67M
- In Apr-2023 average prices are between \$164-\$166 and shares are 51M
- In May-2023 average prices are between \$171-\$174 and shares are 58M
- In Jun-2023 average prices are between
 \$183 \$185 and shares are 62M
- In July-2023 average prices are between
 \$191 \$194 and shares are 51M

Row Labels 🔻	Average Opening Price	Average Highest Price	Average Lowest Price	Average Closing Price	Average Total Number of Shares
⊞ Mar	USD 156	USD 158	USD 154	USD 156	67M
⊞ Apr	USD 164	USD 166	USD 164	USD 165	51M
⊞ May	USD 173	USD 174	USD 171	USD 173	58M
⊞Jun	USD 184	USD 185	USD 183	USD 184	62M
⊕ Jul	USD 192	USD 194	USD 191	USD 192	51M

HYPOTHESIS TESTING

Hypothesis:

Is the opening price impact the number of shares?

Statistical Results:

Results are statistically significant. It rejects the null hypothesis

Interpretation:

Opening price has no impact on the number of shares.

t-Test: Two-Sample Assuming Unequal Variances

	Open	Number of shares
Mean	173.49374	58022825.93
Variance	174.6831261	2.62801E+14
Observations	100	99
Hypothesized Mean Difference	0	
df	98	
t Stat	-35.61244333	
P(T<=t) one-tail	3.54141E-58	
t Critical one-tail	1.660551217	
P(T<=t) two-tail	7.08282E-58	
t Critical two-tail	1.984467455	