FRA
Part B

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FRA Part B

Problem Statement

1. The dataset contains 6 years of information(weekly stock information) on the stock prices of 10 different Indian Stocks. Calculate the mean and standard deviation on the stock returns and share insights. You are expected to do the Market Risk Analysis using Python.

	Date	Infosys	Indian Hotel	Mahindra & Mahindra	Axis Bank	SAIL	Shree Cement	Sun Pharma	Jindal Steel	Idea Vodafone	Jet Airways
0	31-03-2014	264	69	455	263	68	5543	555	298	83	278
1	07-04-2014	257	68	458	276	70	5728	610	279	84	303
2	14-04-2014	254	68	454	270	68	5649	607	279	83	280
3	21-04-2014	253	68	488	283	68	5692	604	274	83	282
4	28-04-2014	256	65	482	282	63	5582	611	238	79	243

Figure 1.1

Fixing the messy columns

Head:

	Date	Infosys	IndianHotel	Mahindra&Mahindra	AxisBank	SAIL	ShreeCement	SunPharma	JindalSteel	IdeaVodafone	JetAirways
0	31-03-2014	264	69	455	263	68	5543	555	298	83	278
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Figure 1.2

Tail:

	Date	Infosys	IndianHotel	Mahindra&Mahindra	AxisBank	SAIL	ShreeCement	SunPharma	JindalSteel	IdeaVodafone	JetAirways
309	02-03-2020	729	120	469	658	33	23110	401	146	3	22
310	09-03-2020	634	114	427	569	30	21308	384	121	6	18
311	16-03-2020	577	90	321	428	27	18904	365	105	3	16
312	23-03-2020	644	75	293	360	21	17666	338	89	3	14
313	30-03-2020	633	75	284	379	23	17546	352	82	3	14

Figure 1.3

To know the number of rows and columns

```
The number of rows (observations) is 314
The number of columns (variables) is 11
```

Figure 1.4

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 314 entries, 0 to 313
Data columns (total 11 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   Date               314 non-null    object
 1   Infosys            314 non-null    int64
 2   IndianHotel        314 non-null    int64
 3   Mahindra&Mahindra  314 non-null    int64
 4   AxisBank           314 non-null    int64
 5   SAIL               314 non-null    int64
 6   ShreeCement        314 non-null    int64
 7   SunPharma          314 non-null    int64
 8   JindalSteel        314 non-null    int64
 9   IdeaVodafone       314 non-null    int64
 10  JetAirways         314 non-null    int64
dtypes: int64(10), object(1)
memory usage: 27.1+ KB
```

Figure 1.5

2. PART B: Draw Stock Price Graph(Stock Price vs Time) for any 2 given stocks with inference

Changing the format of 'Date' column from object to Timeframe

```
Text(0.5, 1.0, 'MRD Infosys Stock Price 1/1/14 - 10/2/20')
```

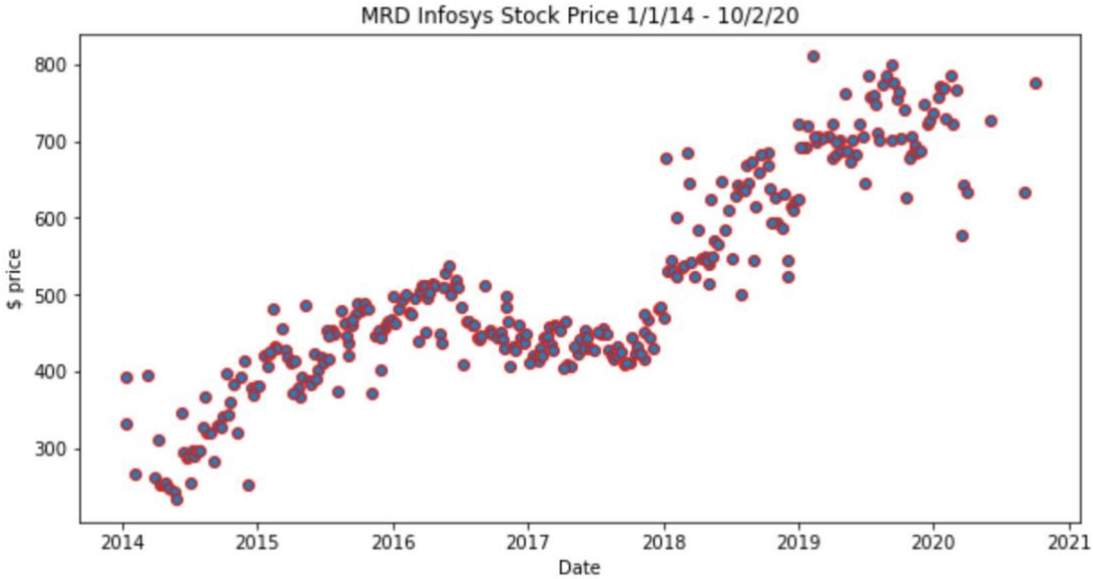

Figure 2.1

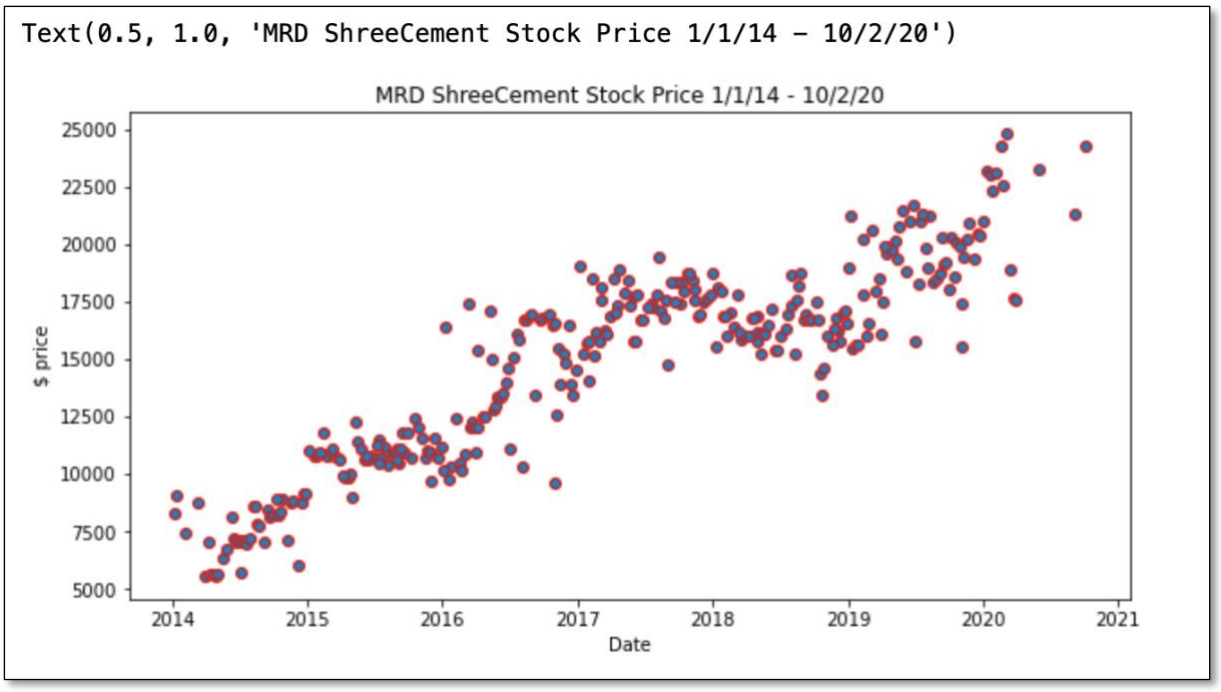

Figure 2.2

The stock price for Infosys has started from 300 in the 2014 and gone for a max of 800 in 2020/2021. We could see a steady increase in the stock price starting from 2014 till mid of 2016. After that there is slight decline in the price amount from end of 2016 till 2018. The price has a low of close to 400 and then recovered steadily to reach the max level.

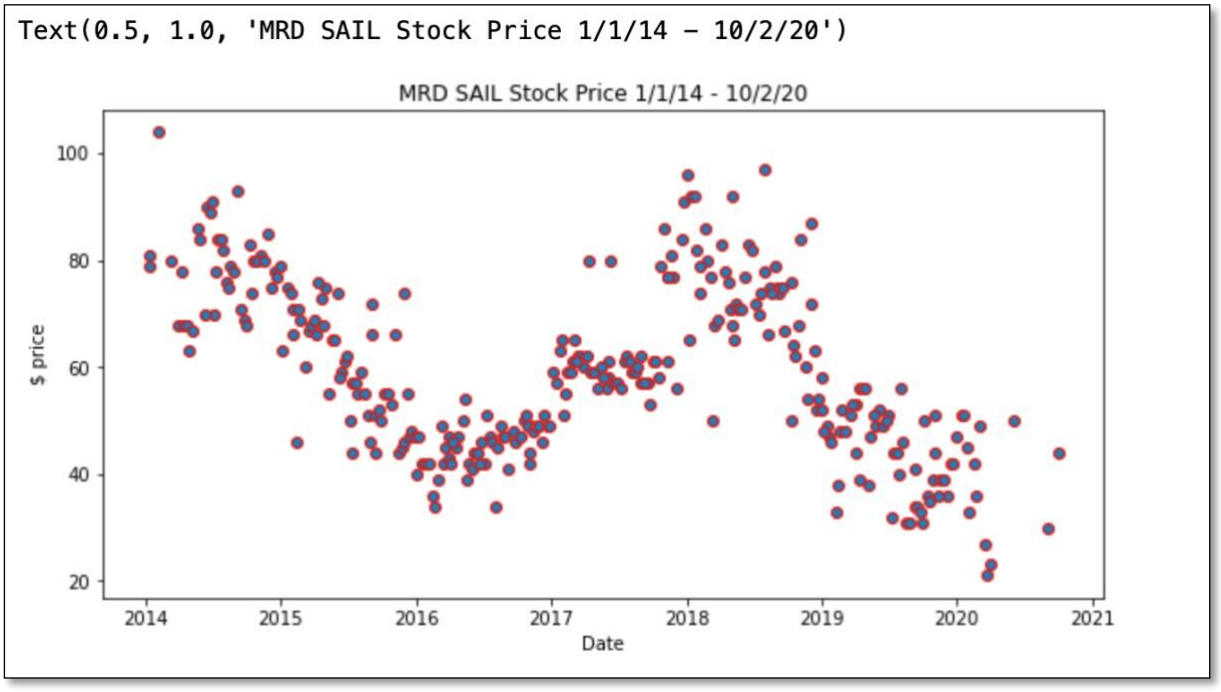

Figure 2.3

This is a completely different scenario where the stock price for SAIL at 2014 was at it peak of 100. Then the downward graph shows that the stock price has got to 40 by 2016(approx). After a steady increase or recovery again from mid of 2018 the price of each stock has gone to complete low of 20.

3. PART B: Calculate Returns for all stocks with inference

Using Log method for calculating the returns

	Infosys	IndianHotel	Mahindra&Mahindra	AxisBank	SAIL	ShreeCement	SunPharma	JindalSteel	IdeaVodafone	JetAirways
0	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
1	-0.026873	-0.014599	0.006572	0.048247	0.028988	0.032831	0.094491	-0.065882	0.011976	0.086112
2	-0.011742	0.000000	-0.008772	-0.021979	-0.028988	-0.013888	-0.004930	0.000000	-0.011976	-0.078943
3	-0.003945	0.000000	0.072218	0.047025	0.000000	0.007583	-0.004955	-0.018084	0.000000	0.007117
4	0.011788	-0.045120	-0.012371	-0.003540	-0.076373	-0.019515	0.011523	-0.140857	-0.049393	-0.148846
...	...	...	...	...	...	...	...	...	...	...
309	0.009649	-0.110348	0.030305	-0.057580	-0.087011	0.023688	0.072383	-0.053346	-0.287682	-0.127833
310	-0.139625	-0.051293	-0.093819	-0.145324	-0.095310	-0.081183	-0.043319	-0.187816	0.693147	-0.200671
311	-0.094207	-0.236389	-0.285343	-0.284757	-0.105361	-0.119709	-0.050745	-0.141830	-0.693147	-0.117783
312	0.109856	-0.182322	-0.091269	-0.173019	-0.251314	-0.067732	-0.076851	-0.165324	0.000000	-0.133531
313	-0.017228	0.000000	-0.031198	0.051432	0.090972	-0.006816	0.040585	-0.081917	0.000000	0.000000

314 rows × 10 columns

Figure 3.1

We can see that first row values are NaN as it does not have a previous value.
Following that we have got the returns for all other stocks.

4. PART B: Calculate Stock Means and Standard Deviation for all stocks with inference

We now look at Means & Standard Deviations of these returns

- Stock Means: Average returns that the stock is making on a week to week basis
- Stock Standard Deviation : It is the risk involved in the returns of each stock

Calculating the mean/Average Returns

```
Infosys              0.002794
IndianHotel          0.000266
Mahindra&Mahindra   -0.001506
AxisBank             0.001167
SAIL                -0.003463
ShreeCement          0.003681
SunPharma           -0.001455
JindalSteel         -0.004123
IdeaVodafone        -0.010608
JetAirways          -0.009548
dtype: float64
```

Figure 4.1

Calculating the SD/volatility

```
Infosys              0.035070
IndianHotel          0.047131
Mahindra&Mahindra    0.040169
AxisBank             0.045828
SAIL                 0.062188
ShreeCement          0.039917
SunPharma            0.045033
JindalSteel          0.075108
IdeaVodafone         0.104315
JetAirways           0.097972
dtype: float64
```

Figure 4.2

Creating a dataframe for AverageReturns and Standard deviation

	Average	Volatility
Infosys	0.002794	0.035070
IndianHotel	0.000266	0.047131
Mahindra&Mahindra	-0.001506	0.040169
AxisBank	0.001167	0.045828
SAIL	-0.003463	0.062188
ShreeCement	0.003681	0.039917
SunPharma	-0.001455	0.045033
JindalSteel	-0.004123	0.075108
IdeaVodafone	-0.010608	0.104315
JetAirways	-0.009548	0.097972

Figure 4.3

So in this calculation of mean and standard deviations Mean talks about the average returns Standard deviation talk about the risk/volatility involved in the average returns of the stock amount. So from the above data frame we can conclude that.

- Mahindra&Mahindra, SAIL, SunPharma, JindalSteel, IdeaVodafone, JetAirways all of these stock show negative returns.
- So it is a wise decision not to invest in this stock without even considering their Volatility.
- Stocks with higher return and lower volatility should be considered so in this case we need to think of stocks such as 'ShreeCement', 'Infosys' To conclude by using simple mean and standard deviation we can make some wise choices by predicting the right stocks.

5. PART B: Draw a plot of Stock Means vs Standard Deviation and state your inference

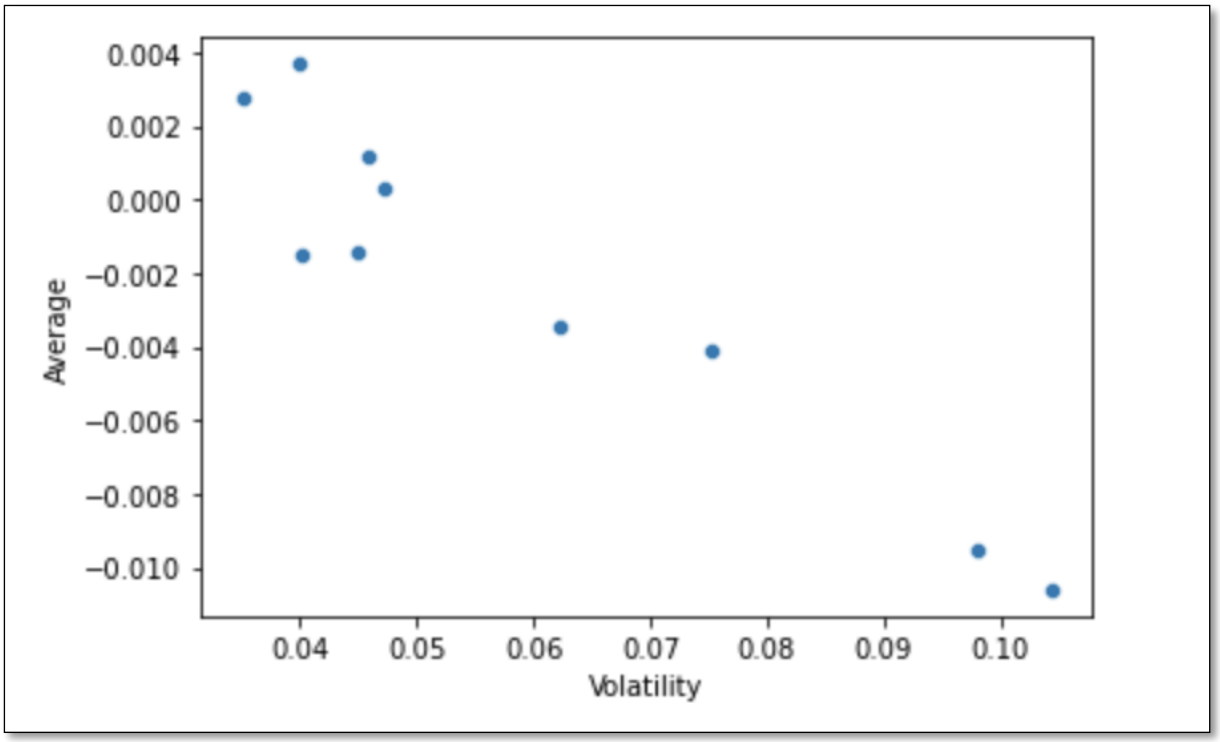

Figure 5.1

- There are stocks which gives high returns on the top left corner of the plot which also has very low volatility.
- On the Right corner there are stocks which give low returns and high volatility.
- There are two stocks in between which needs to be carefully analysed as in this case the stocks might be in earge of moving up which give high returns or might have been in decline where most of customers have already sold their stocks which mean its volatility is high and returns will be low.

6. PART B: Conclusions and Recommendations

1) Initially we have drawn a plot for couple of stocks such as Infosys and SAIL for the last six years of given data set, from which we came to a conclusion that the price amount of Infosys stocks were moving on the upward direction but whereas for SAIl it has gone down hence by this scenario one cannot predict that the Infosys stocks yield higher returns compared to that of SAIL.
2) Hean we have derived Average returns and Standard Deviation for all the stocks and stored in a data frame format.
3) From this data frame we could suggest our client or one get an idea of how much the returns will be each stock and its volatility.
4) Ideally higher returns and lower volatility is the preferred stock.
5) In this perspective stocks such as 'ShreeCement', 'Infosys' has higher returns and lower volatility.
6) Stocks like Mahindra&Mahindra, SAIL, SunPharma, JindalSteel, IdeaVodafone, JetAirways all of these stock show negative returns.
7) Stocks such as IndianHotel and AxisBank give us positive returns but there volatility is high.

8) To conclude by using simple mean and standard deviation we can make some wise choices by predicting the right stocks.