

# Business Report

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## Problem Statement:

- 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.
- Let's have a look at data

	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
...	...	...	...	...	...	...	...	...	...	...	...
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

314 rows x 11 columns

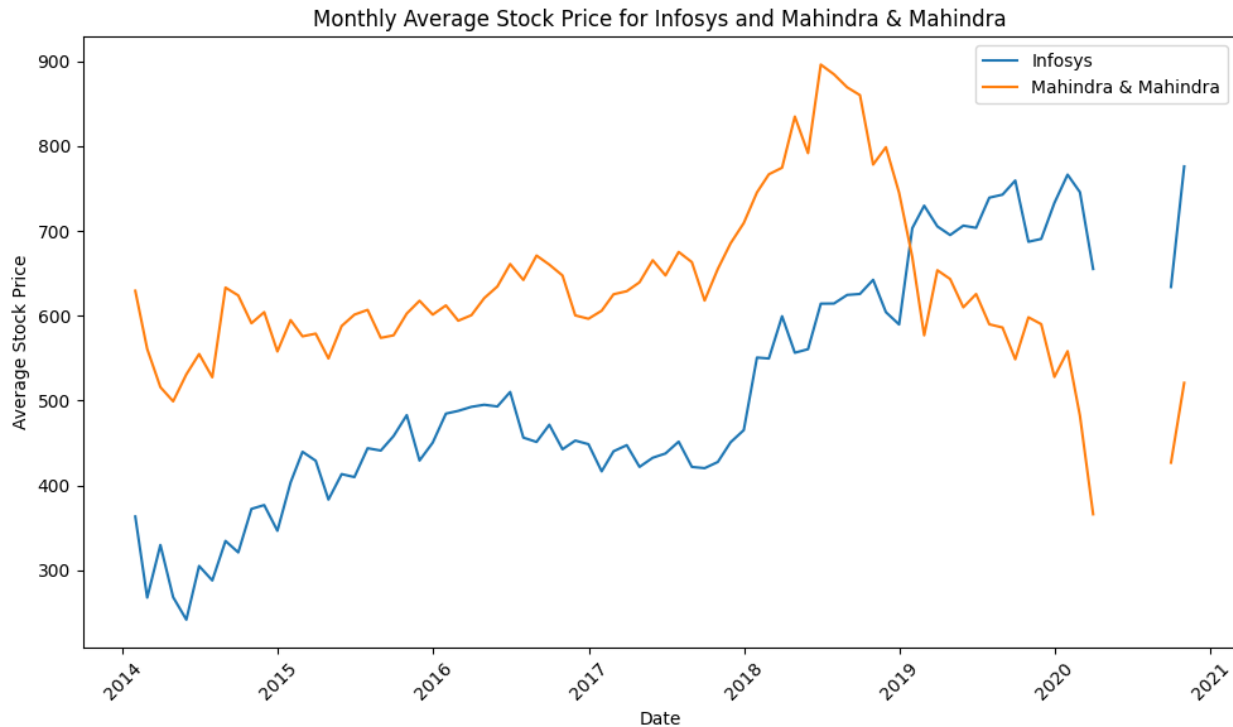
- The number of rows (observations) is 314
- The number of columns (variables) is 11

```
#   Column                Non-Null Count  Dtype
---  -
0   Date                  314 non-null    object
1   Infosys                314 non-null    int64
2   Indian Hotel            314 non-null    int64
3   Mahindra & Mahindra     314 non-null    int64
4   Axis Bank               314 non-null    int64
5   SAIL                    314 non-null    int64
6   Shree Cement            314 non-null    int64
7   Sun Pharma              314 non-null    int64
8   Jindal Steel            314 non-null    int64
9   Idea Vodafone           314 non-null    int64
10  Jet Airways             314 non-null    int64
dtypes: int64(10), object(1)
memory usage: 27.1+ KB
```

- Date column is object data type will be changed to Date time format.

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

- Let's have a look at stock price of Infosys and Mahindra & Mahindra



- Until 2019, Infosys had a lower average monthly stock price compared to Mahindra & Mahindra.
- Post-2019, Infosys's stock price exceeded that of Mahindra & Mahindra.
- Mahindra & Mahindra's stock price witnessed a decline from mid-2018 to 2020.
- In contrast, Infosys displayed a continuous upward trajectory in its stock price from 2014 to 2020.

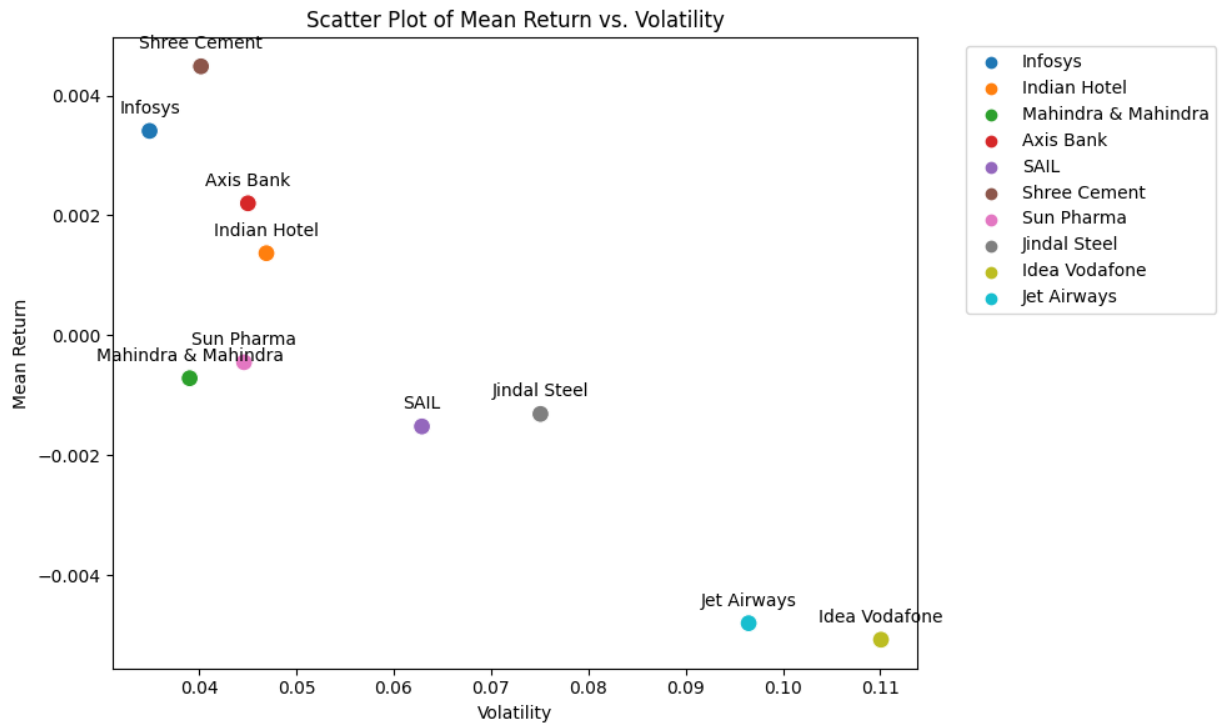
## PART B: Calculate Returns for all stocks with inference

- Let's calculate the return on all stocks.
- Weekly return looks like this

	Infosys	Indian Hotel	Mahindra & Mahindra	Axis Bank	SAIL	Shree Cement	Sun Pharma	Jindal Steel	Idea Vodafone	Jet Airways
Date										
2014-03-31	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN	NaN
2014-07-04	-0.026515	-0.014493	0.006593	0.049430	0.029412	0.033375	0.099099	-0.063758	0.012048	0.089928
2014-04-14	-0.011673	0.000000	-0.008734	-0.021739	-0.028571	-0.013792	-0.004918	0.000000	-0.011905	-0.075908
2014-04-21	-0.003937	0.000000	0.074890	0.048148	0.000000	0.007612	-0.004942	-0.017921	0.000000	0.007143
2014-04-28	0.011858	-0.044118	-0.012295	-0.003534	-0.073529	-0.019325	0.011589	-0.131387	-0.048193	-0.138298
...	...	...	...	...	...	...	...	...	...	...
2020-02-03	0.009695	-0.104478	0.030769	-0.055954	-0.083333	0.023971	0.075067	-0.051948	-0.250000	-0.120000
2020-09-03	-0.130316	-0.050000	-0.089552	-0.135258	-0.090909	-0.077975	-0.042394	-0.171233	1.000000	-0.181818
2020-03-16	-0.089905	-0.210526	-0.248244	-0.247803	-0.100000	-0.112821	-0.049479	-0.132231	-0.500000	-0.111111
2020-03-23	0.116118	-0.166667	-0.087227	-0.158879	-0.222222	-0.065489	-0.073973	-0.152381	0.000000	-0.125000
2020-03-30	-0.017081	0.000000	-0.030717	0.052778	0.095238	-0.006793	0.041420	-0.078652	0.000000	0.000000

- We have calculated the mean return for all stocks and volatility of each sock

	Mean	standard_deviation	Mean_return	volatility
Infosys	511.340764	135.952051	0.003409	0.034910
Indian Hotel	114.560510	22.509732	0.001369	0.046914
Mahindra & Mahindra	636.678344	102.879975	-0.000717	0.039029
Axis Bank	540.742038	115.835569	0.002201	0.045018
SAIL	59.095541	15.810493	-0.001521	0.062899
Shree Cement	14806.410828	4288.275085	0.004487	0.040192
Sun Pharma	633.468153	171.855893	-0.000451	0.044616
Jindal Steel	147.627389	65.879195	-0.001313	0.075079
Idea Vodafone	53.713376	31.248985	-0.005080	0.110075
Jet Airways	372.659236	202.262668	-0.004805	0.096473



- The analysis reveals that among the stocks considered, Shree Cement, Infosys, Axis Bank, and Indian Hotel stand out due to their positive returns and relatively low volatility.

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

	Mean	standard_deviation	Mean_return	volatility
Infosys	511.340764	135.952051	0.003409	0.034910
Indian Hotel	114.560510	22.509732	0.001369	0.046914
Mahindra & Mahindra	636.678344	102.879975	-0.000717	0.039029
Axis Bank	540.742038	115.835569	0.002201	0.045018
SAIL	59.095541	15.810493	-0.001521	0.062899
Shree Cement	14806.410828	4288.275085	0.004487	0.040192
Sun Pharma	633.468153	171.855893	-0.000451	0.044616
Jindal Steel	147.627389	65.879195	-0.001313	0.075079
Idea Vodafone	53.713376	31.248985	-0.005080	0.110075
Jet Airways	372.659236	202.262668	-0.004805	0.096473

- **Infosys:**

- Mean: 511.34
- Standard Deviation: 135.95
- **Inference:** Infosys has a relatively high mean value and standard deviation. This suggests that while it has the potential for higher returns, it also comes with higher risk due to its significant fluctuations.

- **Indian Hotel:**

- Mean: 114.56
- Standard Deviation: 22.51
- **Inference:** Indian Hotel has a moderate mean value and a relatively low standard deviation. This indicates that it may have a stable performance with lower volatility compared to some other stocks.

- **Mahindra & Mahindra:**

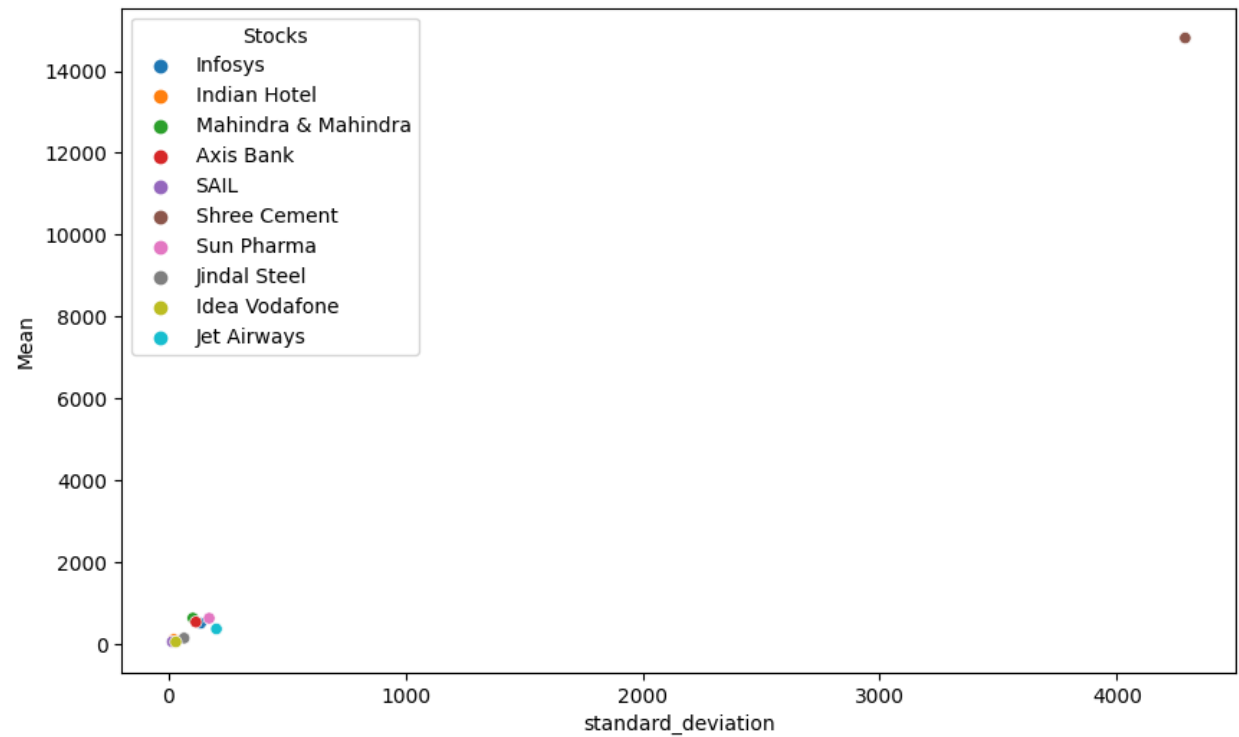
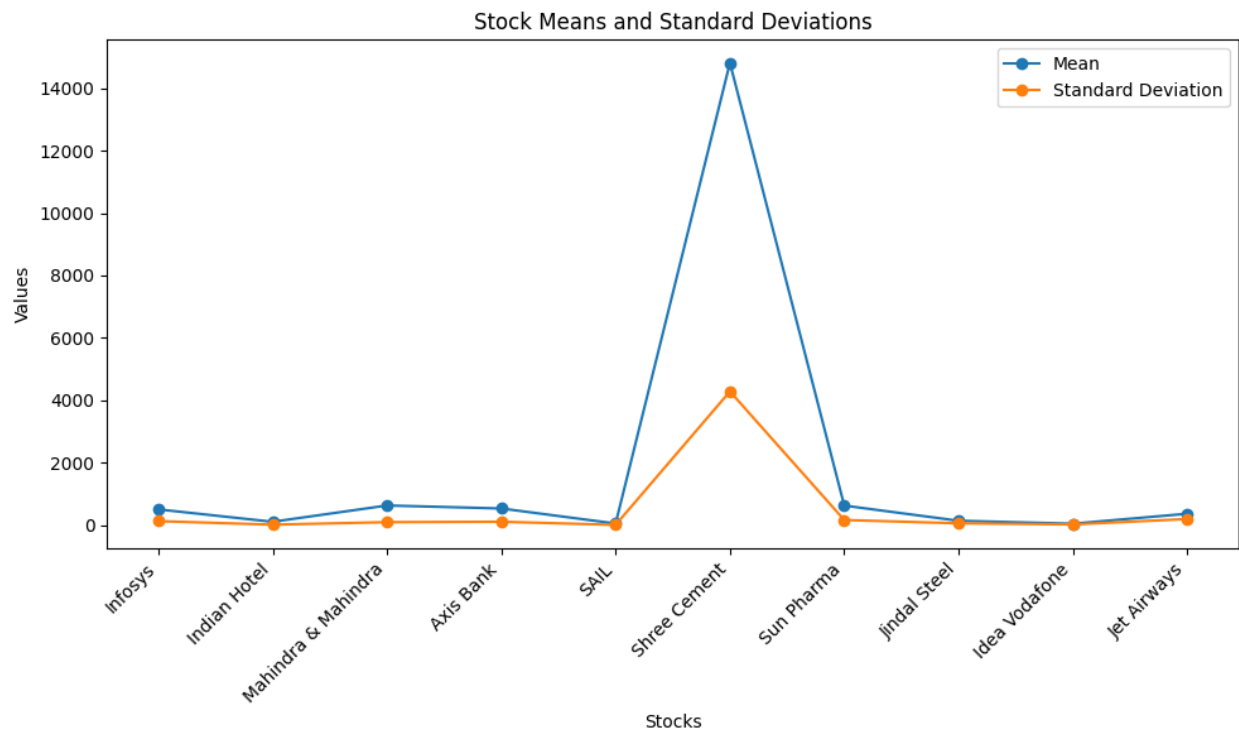
- Mean: 636.68

- Standard Deviation: 102.88
- **Inference:** Mahindra & Mahindra has a higher mean value but moderate standard deviation. This suggests that it may offer good returns but with a moderate level of risk.
- **Axis Bank:**
  - Mean: 540.74
  - Standard Deviation: 115.84
  - **Inference:** Axis Bank has a relatively high mean value and standard deviation. It might have the potential for higher returns, but investors should be cautious due to its higher risk.
- **SAIL:**
  - Mean: 59.10
  - Standard Deviation: 15.81
  - **Inference:** SAIL has a lower mean value and a relatively low standard deviation. It might be a stable option with lower returns but lower risk as well.
- **Shree Cement:**
  - Mean: 14806.41
  - Standard Deviation: 4288.28
  - **Inference:** Shree Cement has a significantly high mean value and standard deviation, indicating high potential returns but also substantial volatility. Investors should be prepared for larger fluctuations.
- **Sun Pharma:**
  - Mean: 633.47
  - Standard Deviation: 171.86



- **Inference:** Sun Pharma has a relatively high mean value and standard deviation. This implies potential for higher returns, but also higher risk due to notable price fluctuations.
- **Jindal Steel:**
  - Mean: 147.63
  - Standard Deviation: 65.88
  - **Inference:** Jindal Steel has a moderate mean value and standard deviation. This suggests a balance between potential returns and risk.
- **Idea Vodafone:**
  - Mean: 53.71
  - Standard Deviation: 31.25
  - **Inference:** Idea Vodafone has a lower mean value and a relatively low standard deviation. It might be a stable choice with lower returns but lower risk as well.
- **Jet Airways:**
  - Mean: 372.66
  - Standard Deviation: 202.26
  - **Inference:** Jet Airways has a moderate mean value but a relatively high standard deviation. This indicates potential returns with a moderate level of risk.

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



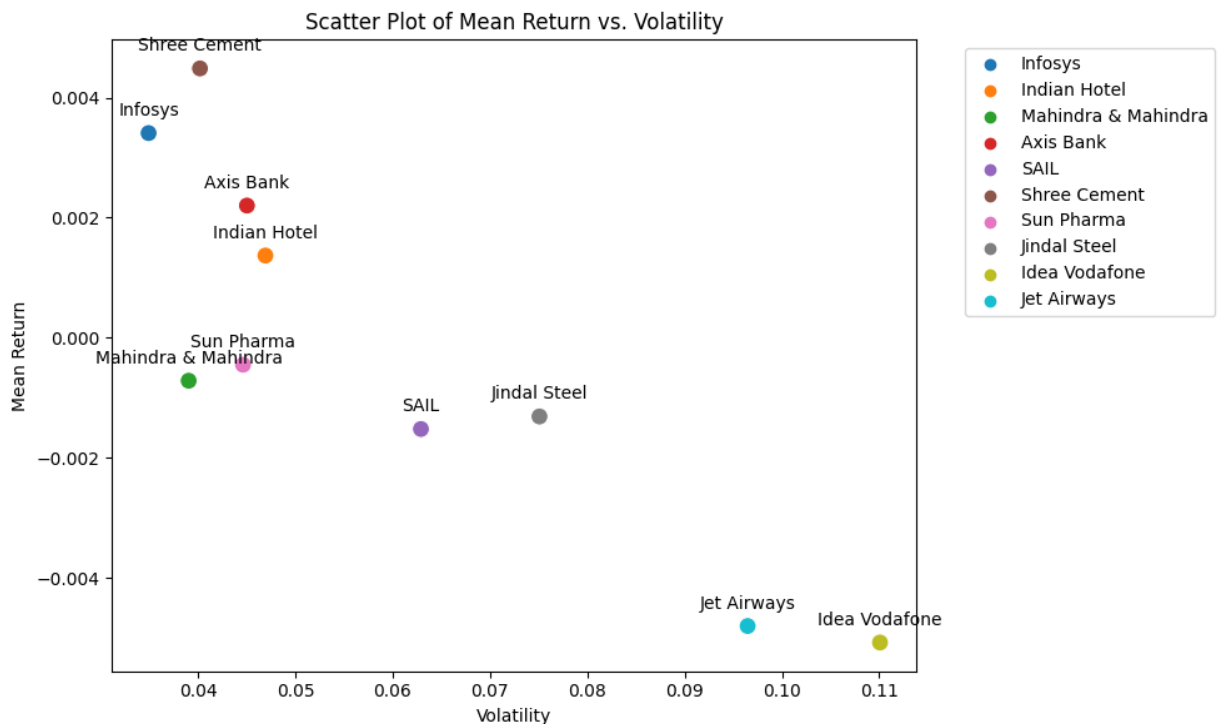
- It can be clearly seen that Shree cement has the highest stock value and standard deviation.
- We should also look at ratio of sigma/mean which is coefficient of variation

	Stocks	Mean	standard_deviation	Mean_return	volatility	Coefficient_of_Variation
5	Shree Cement	14806.410828	4288.275085	0.004487	0.040192	8.958331
0	Infosys	511.340764	135.952051	0.003409	0.034910	10.239930
3	Axis Bank	540.742038	115.835569	0.002201	0.045018	20.449478
1	Indian Hotel	114.560510	22.509732	0.001369	0.046914	34.275954

- If we check for positive mean returns only then we notice that shree cement varies minimum , then infosys then axis and then Indian hotel.

## PART B: Conclusions and Recommendations

- Looking at below two figures we can say that



	Stocks	Mean	standard_deviation	Mean_return	volatility	Coefficient_of_Variation
5	Shree Cement	14806.410828	4288.275085	0.004487	0.040192	8.958331
0	Infosys	511.340764	135.952051	0.003409	0.034910	10.239930
3	Axis Bank	540.742038	115.835569	0.002201	0.045018	20.449478
1	Indian Hotel	114.560510	22.509732	0.001369	0.046914	34.275954

- Shree Cement:** Shree Cement stands out with a significantly high mean return of 0.004487. Although its standard deviation and volatility are also relatively higher, its coefficient of variation (8.958%) indicates a moderate level of risk compared to its potential return. Investors willing to take on slightly higher risk may consider Shree Cement for potential returns.
- Infosys:** Infosys exhibits a commendable mean return of 0.003409 with a relatively lower standard deviation and volatility. The coefficient of variation (10.240%) suggests a balanced risk-to-return ratio. Infosys seems to offer a stable investment option for those seeking consistent returns with relatively lower risk.
- Axis Bank:** Axis Bank presents a mean return of 0.002201, demonstrating consistent performance. With a moderate standard deviation and volatility, its coefficient of variation (20.449%) indicates a relatively higher risk compared to its potential return. Investors looking for moderate risk and potential returns might consider Axis Bank.
- Indian Hotel:** Indian Hotel offers a modest mean return of 0.001369. Its standard deviation and volatility are also moderate, resulting in a coefficient of variation (34.276%) that suggests a higher risk-to-return trade-off. Investors willing to explore slightly riskier options for potential returns could consider Indian Hotel.
- Overall Recommendation for all stocks**

Stock	Mean Return	Standard Deviation	Volatility	Recommendation
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<b>Infosys</b>	0.34%	135.95	3.49%	Consider it as part of a diversified portfolio.
<b>Indian Hotel</b>	0.14%	22.51	4.69%	Approach with caution or consider diversification.
<b>Mahindra &amp; Mahindra</b>	-0.07%	102.88	3.90%	Monitor and analyze further.
<b>Axis Bank</b>	0.22%	115.84	4.50%	Consider potential growth.
<b>SAIL</b>	-0.15%	15.81	6.29%	Approach with caution or avoid.
<b>Shree Cement</b>	0.45%	4288.28	4.02%	Suitable for risk-tolerant investors.
<b>Sun Pharma</b>	-0.05%	171.86	4.46%	Approach with caution or consider diversification.
<b>Jindal Steel</b>	-0.13%	65.88	7.51%	Approach with caution or consider diversification.
<b>Idea Vodafone</b>	-0.51%	31.25	11.01%	Approach with caution or avoid.
<b>Jet Airways</b>	-0.48%	202.26	9.65%	Approach with caution or avoid.