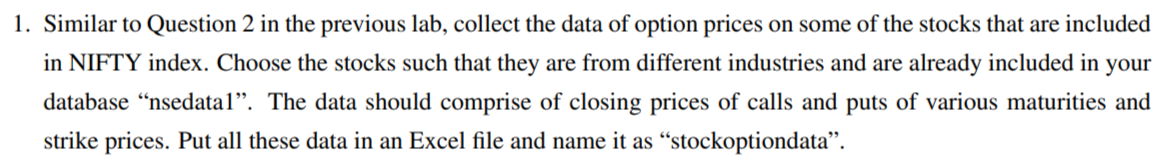
**Financial Engineering Lab MA – 374 Lab – 9**

**Name –** Rasesh Srivastava

**Roll Number –** 210123072

**Branch –** Mathematics and Computing

Question 1:



Data for following companies (from nsedata1) are taken for the analysis:

1. Bajaj-Auto

2. Reliance

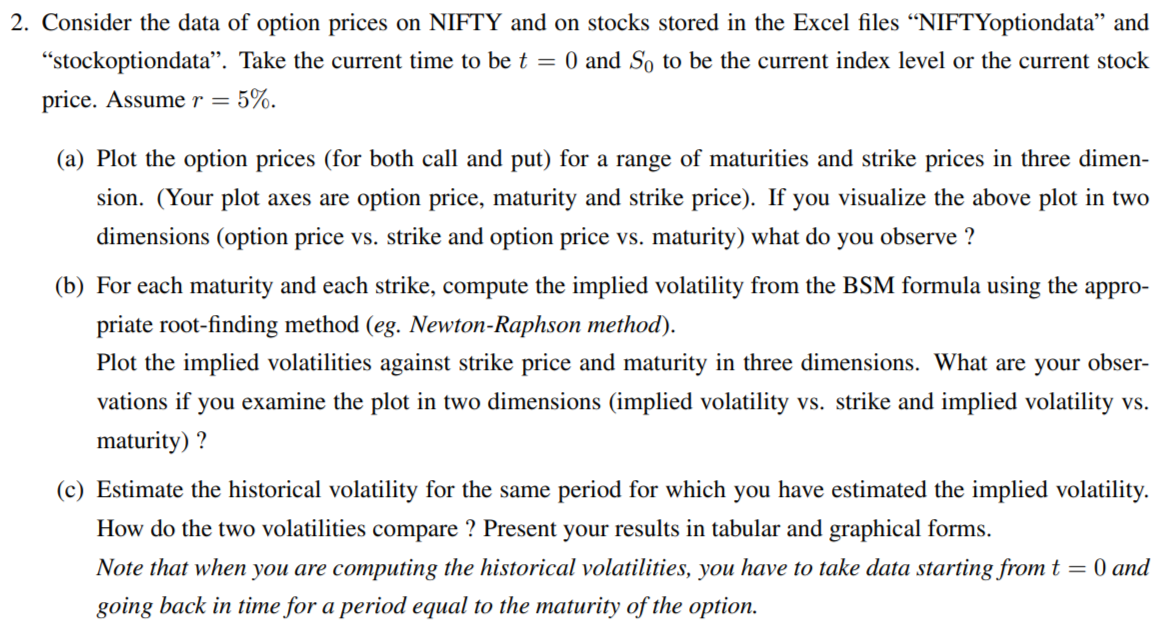
3. HDFC Bank

4. Hero Motor Corp.

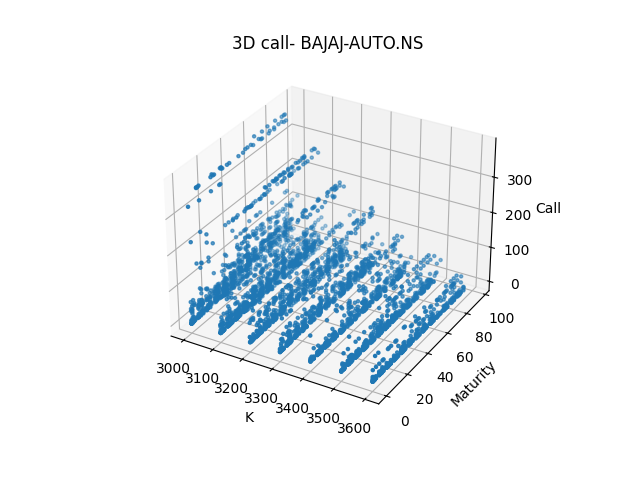
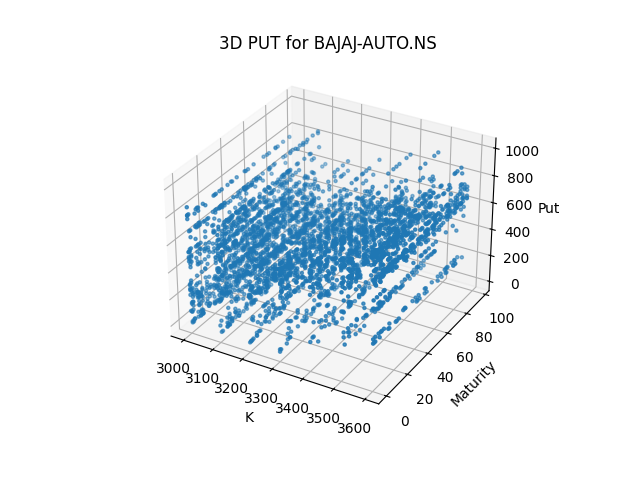
5. Tata Motors

6. NSE Index (NIFTY 50)

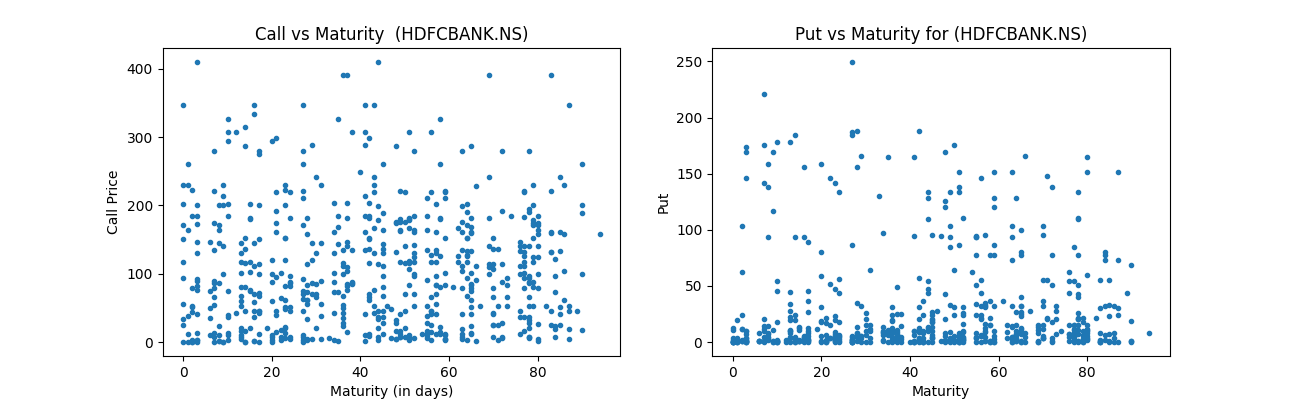
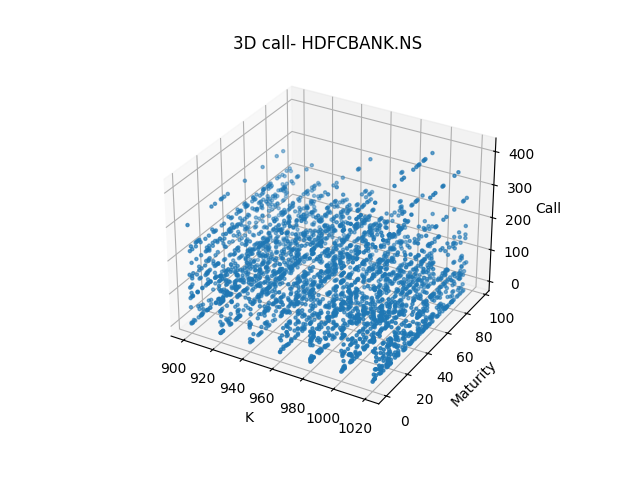
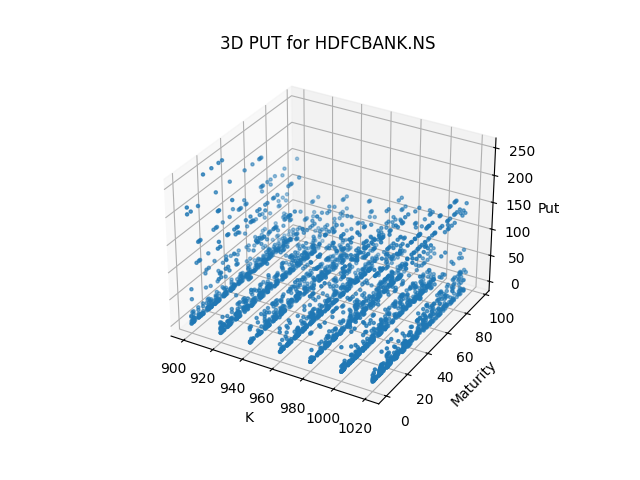
Question 2:

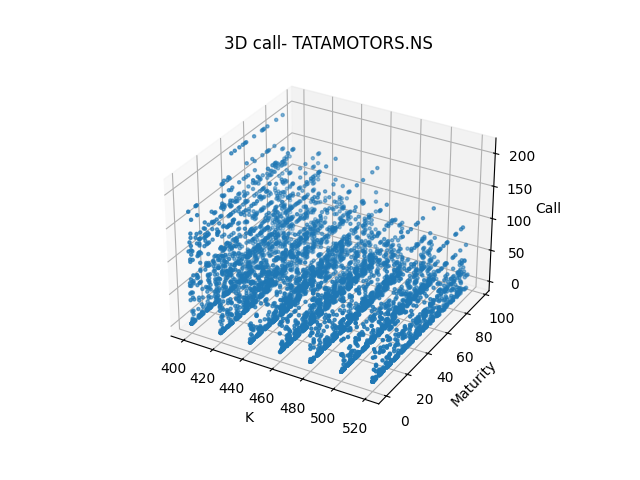
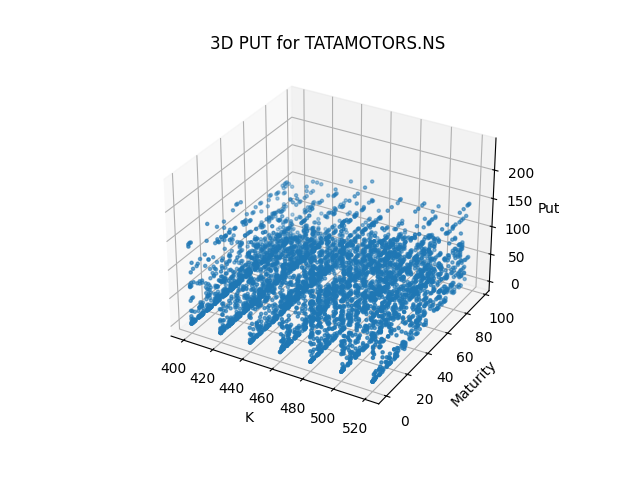


a)

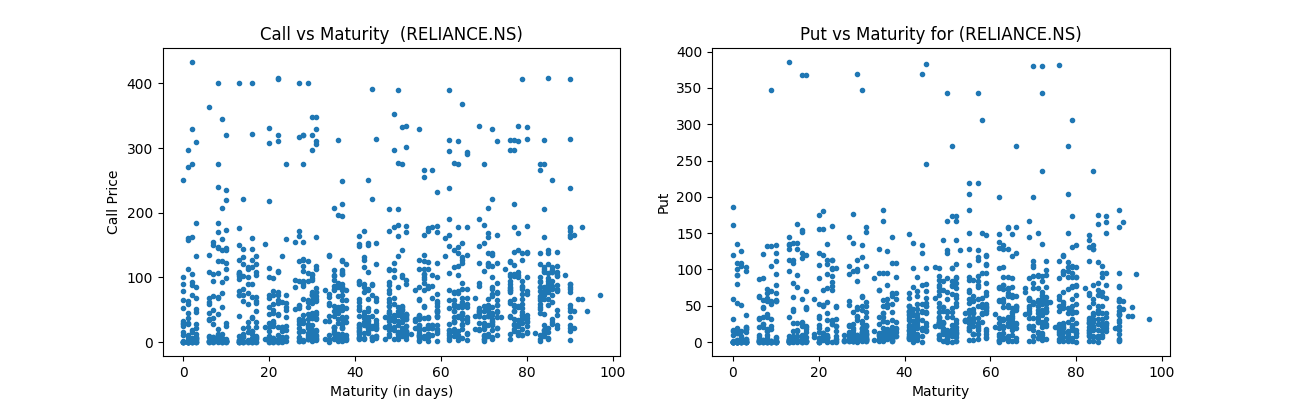
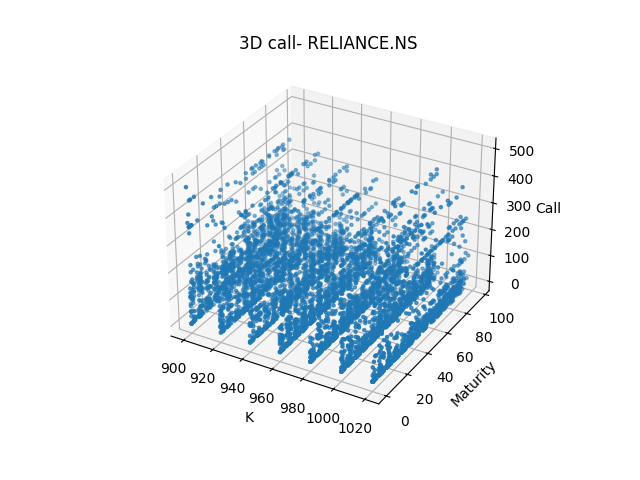
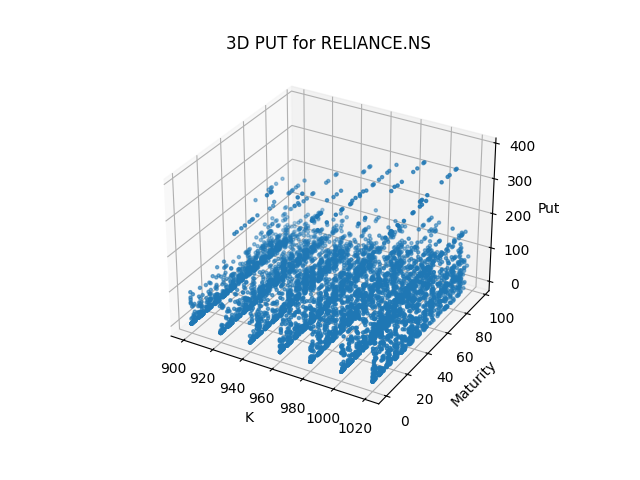
A comparison of blue and white dots

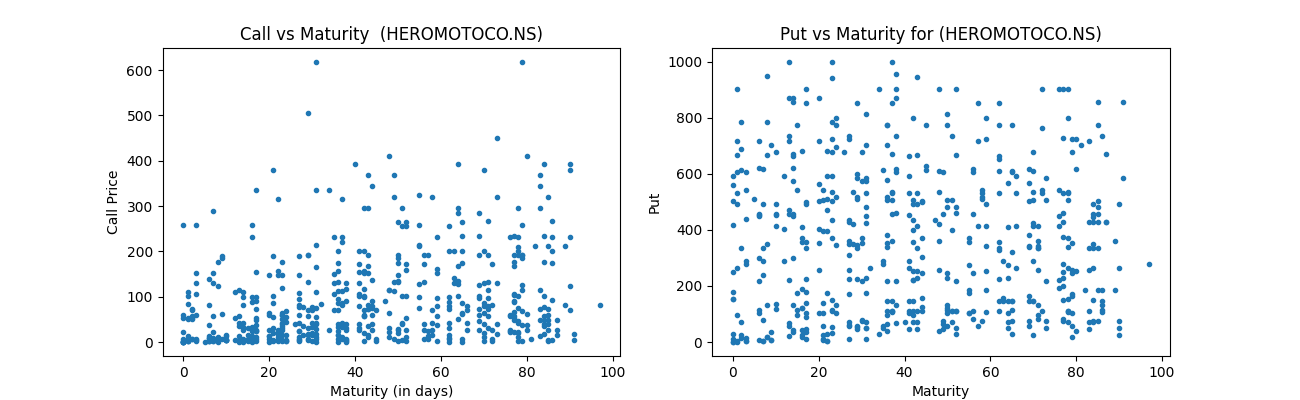
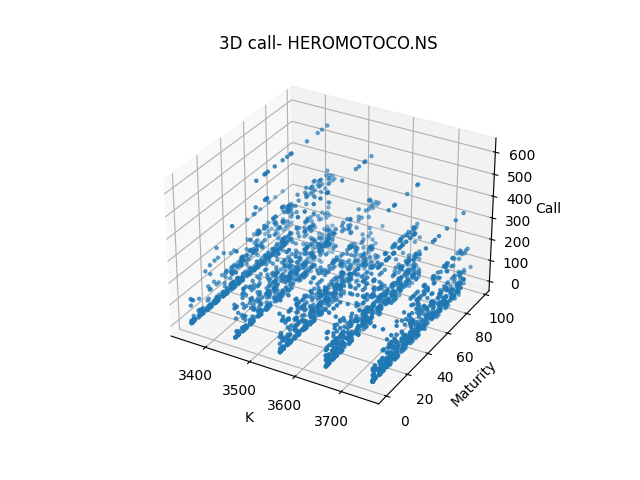
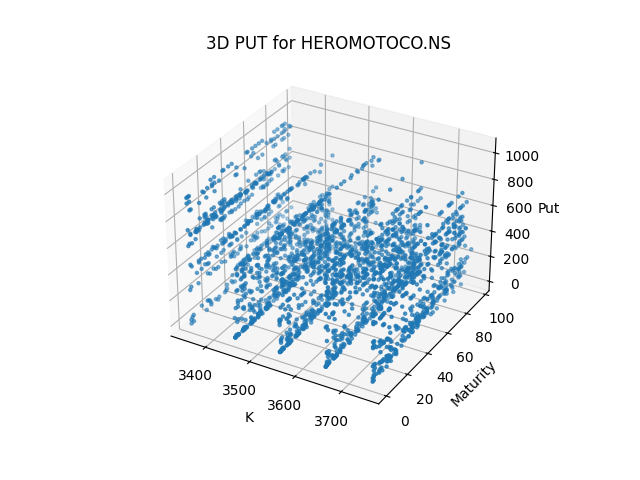
Description automatically generated with medium confidenceA graph of different sizes and colors

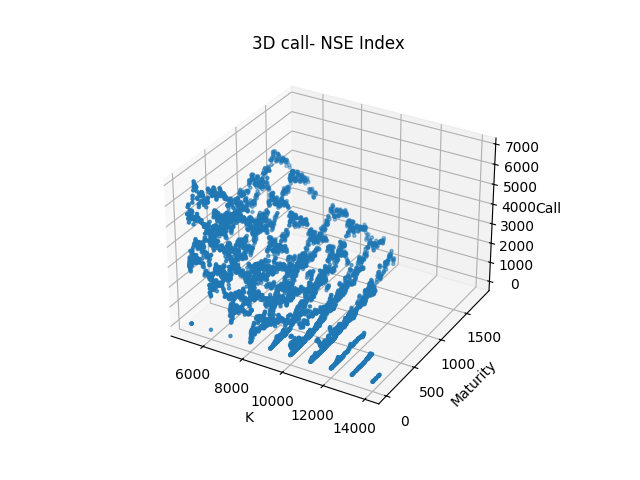
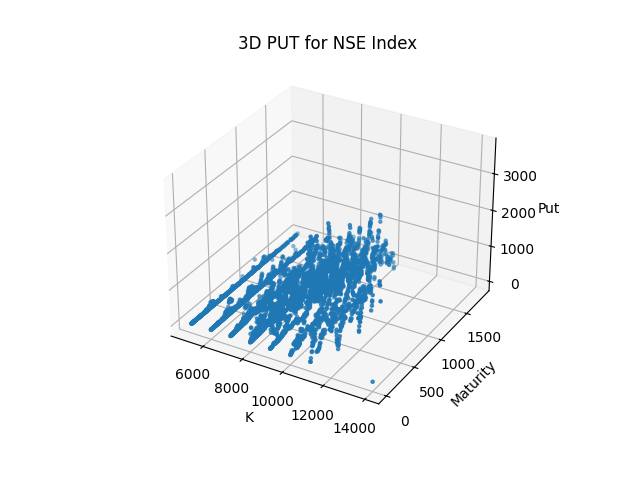
Description automatically generated with medium confidenceA graph of a number of blue and white lines

Description automatically generated with medium confidenceA pair of graphs showing different sizes of data

Description automatically generated with medium confidenceA close-up of a graph

Description automatically generatedA comparison of a graph

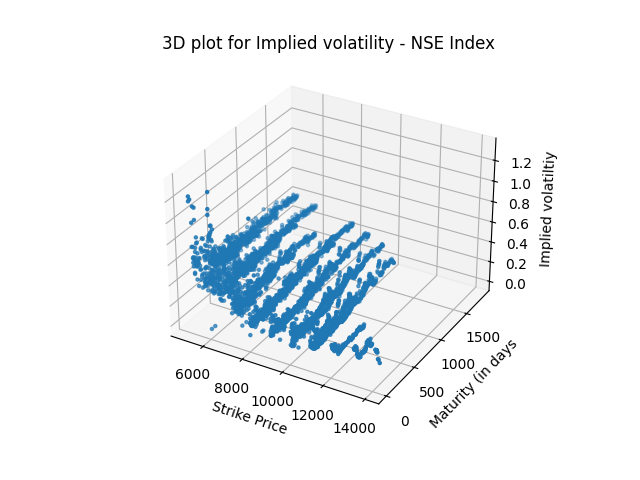
Description automatically generated with medium confidenceA comparison of a graph

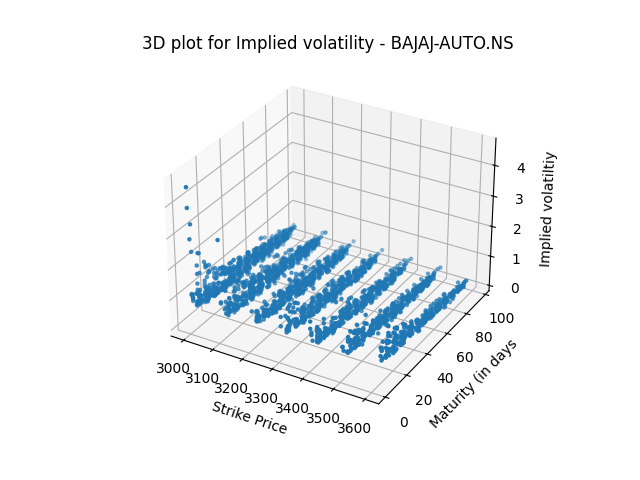
Description automatically generated with medium confidenceA graph of blue dots

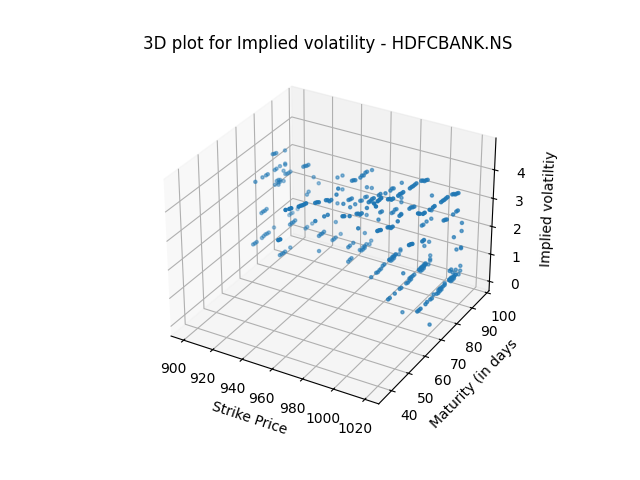
Description automatically generated with medium confidenceA comparison of a graph

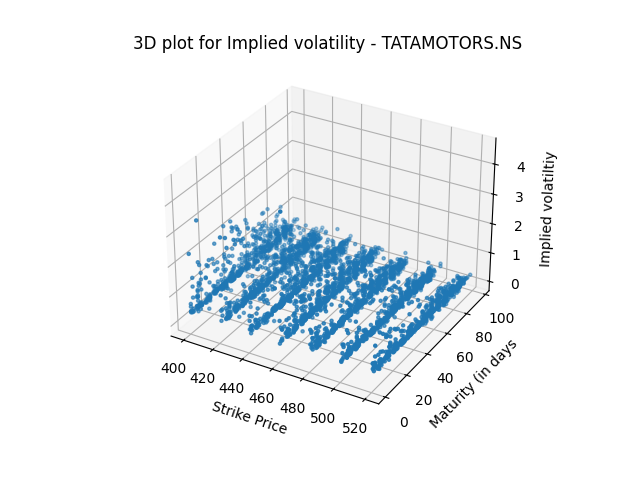
Description automatically generated

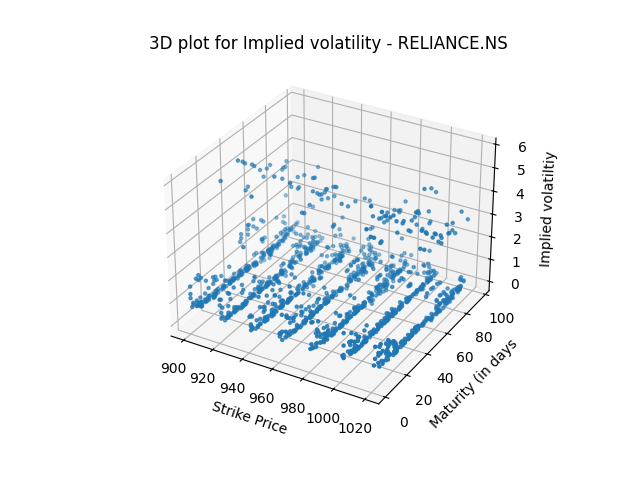
b)

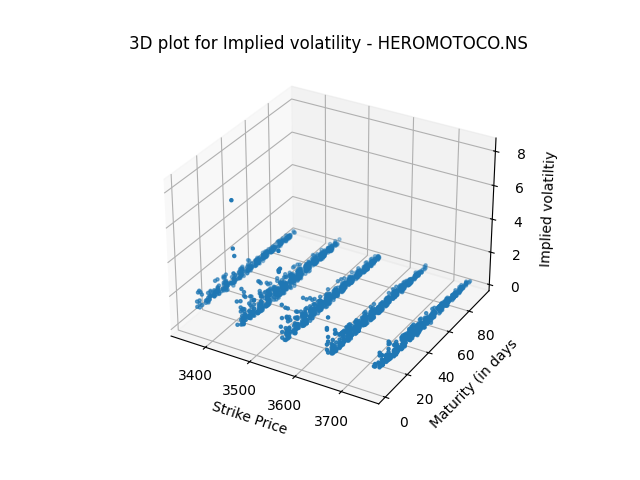
A comparison of a graph

Description automatically generated with medium confidenceA comparison of graphs and diagrams

Description automatically generated with medium confidenceA comparison of a graph

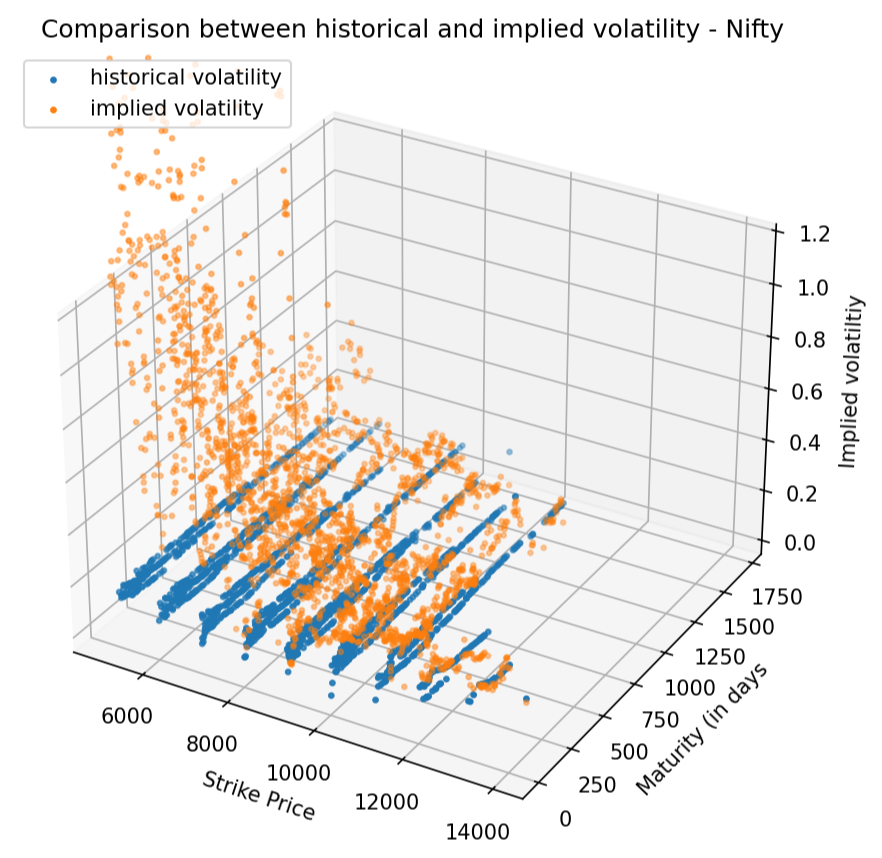
Description automatically generatedA comparison of a graph

Description automatically generated with medium confidenceA comparison of graphs and charts

Description automatically generated with medium confidenceA comparison of graphs with numbers

Description automatically generated with medium confidence

c)



A screenshot of a graph

Description automatically generated

A graph of blue dots

Description automatically generated

The tabular data is as follows:

A screenshot of a computer screen

Description automatically generated

A graph of different colored dots

Description automatically generated

A comparison of graphs and charts

Description automatically generated with medium confidence

A blue and white dotted diagram

Description automatically generated with medium confidence

The tabular data is as follows:

A screenshot of a computer screen

Description automatically generated

A graph with different colored lines

Description automatically generated

A graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of a graph of

Description automatically generated

A screen shot of a graph

Description automatically generated

The tabular data is as follows:

A screenshot of a computer screen

Description automatically generated

**Observations:**

1. We can observe that the price of call option decreases and that of put option increases with an increase in strike price. This trend is within our expectations.
2. But the plot for call option and put option doesn’t exactly match with our expectations. The general trend is that the price of call option tends to increase while that of put option tends to decrease with an increase in maturity period.
3. The lack of sufficient data adds difficulty in making proper analysis, but general trends can be figured out by considering the plots for NIFTY50 since it has larger data-points. The other plots also show similar trends.
4. Theoretically, the implied volatility is generally a convex function of strike price, and the curve so formed is known as the Volatility Smile. But this feature is not prominently observed in the plotted curves.
5. The volatility generally tends to decrease for larger maturity values, but for some of the above plots this nature is not very much observed.
6. Historical volatility is an estimate of the volatility over the past period, while the implied volatility is the estimation of the volatility for the upcoming months.
7. For data of some of the stocks like NIFTY50 and RELIANCE, implied volatility is generally higher while for stocks like BAJAJ-AUTO and TATAMOTORS, historical volatility is generally higher than the implied volatility. The significant difference between these 2 values arises due to several factors present in real market.
8. The plot for historical vs implied volatility very well captures this relation. Other plots show the dependence of different types of volatility with varying strike price and maturity.
9. Apart from the strike price and maturity period, the implied volatility and the option value also seems to also depend on when the price was collected. This means that even if the period values are same, the prices may differ if they are collected at different point of time. This is because the real market has several other random components, which affect the prices. Owing to this reason, the scatter plots are constructed to capture all these factors.