

COMPARATIVE STUDY OF SUPPORT VECTOR REGRESSION TECHNIQUES IN A PREDICTION MODEL FOR STOCK MARKET VOLATILITY

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Abstract

Stock markets are used to raise the funds by corporate sectors and government organizations. Stock market volatility is an important phenomenon which helps in deciding the nature of market that it is high or low volatile. A predictive model was proposed for stock market volatility using big data analytics and the exclusive big data analysis is required to observe and conclude the trend of market. Both fundamental and technical analyses were used in that model. In fundamental analysis, sentiment analysis was used to find the sentiment score and in case of technical analysis classification and regression techniques were used to predict the future value of a stock.. This paper further represents the predictive results using graphs and also compares results of various Support Vector Regressors i.e. linear, polynomial and radial basic function regression.

Paper Identification



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Introduction

A stock market is a place where shares can be bought or sold for economic transaction purpose through online system. These transactions for buying and selling shares can be done online. Online transactions not only help to increase security and flexibility of operations but also give a platform where analysis of market trend can be performed by mining the history of the previous market trading.

Stock markets are used to raise the funds by corporate sectors and government organizations. Stock market volatility is an important phenomenon. Volatility plays a significant role to generate the uncertainty among the youngsters leading the investors either to withdraw their stocks or make the new investor reluctant to invest. Hence, it is significantly disturb the primary market due to lesser collection of new points and have a negative impact on economic growth.

Prediction Model

A model was proposed and in the results it was shown that the performance of Support Vector Regression is better than the linear regression. Here, fundamental analysis is performed by sentiment analysis and technical analysis is performed by association rule mining and regression techniques. We can see the predicted value in the results of the prediction model. Moreover, it will become clear from the graphs of LR and SVR as follows:

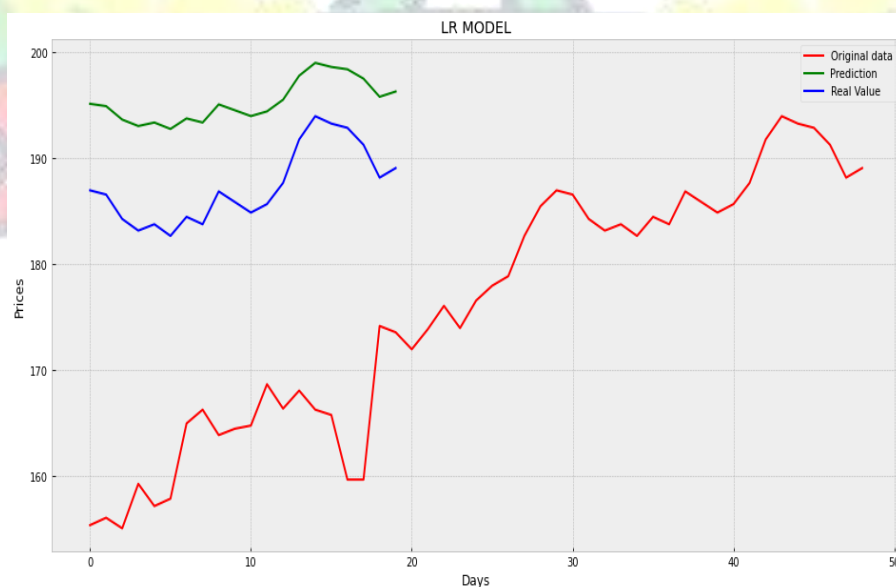


Figure 1: Graph of Original Data, Real Value and Prediction Value for LR.

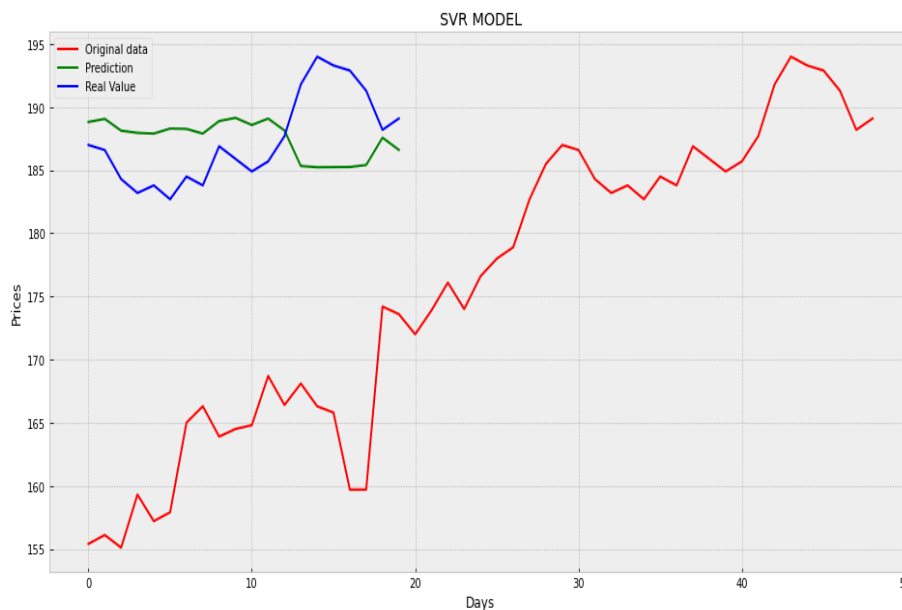


Figure 2: Graph of Original Data, Real Value and Prediction Value for SVR.

Here, the green line shows the predicted values, blue line shows the real values related to particular stock and red lines shows the original data used for analysis. In SVR model, the predicted values are closer to Real value as compared to LR model. Hence the performance of SVR is better in case of prediction.

In the predictive model, fundamental analysis is done using the sentiment score about news related to corona virus and its effect on the market whereas the technical analysis include the association rule mining using the Apriori Algorithm and the regression techniques. In the results obtained from the model, the news related to corona virus has a negative impact on the market and also based on the association rule found, the confidence score was calculated for facebook and state bank of India stocks.

In detail, during data analysis, both technical and fundamental analyses were taken into consideration. In the fundamental analysis, Sentiment score was calculated for news related to Coronavirus and found that the score was negative showing that this disaster (Corona) had a negative impact on the stock market which could also be seen in the moving average graphs of 'FB' and SBIN.NS stocks (yahoo finance) which showed a downward movement during COVID-19 attack. Further, the historical data of these stocks was downloaded from yahoo finance website for a period of about two years and Apriori algorithm was implemented to find out the frequent itemset i.e. those stocks who had a maximum or better (above threshold) support value. Here, out of 'FB' (Facebook), 'SBIN.NS' (State Bank of India), 'AXISBANK.NS' (Axis Bank), 'TTM' (Tata Motors), 'M&M.NS' (Mahindra and Mahindra Motors), only association

was found between two stocks i.e. 'FB' and 'SBIN.NS'. The support value for 'FB' for a 'UP' situation (Rise) was found to be 0.56 and for 'SBIN.NS' it was 0.54. But in the association result, {SBIN.NS, FB} their support value was 0.44 but confidence value for 'FB' was approx 0.81 and for 'SBIN.NS' was approx 0.78. Hence 'FB' stock was selected for further analysis. While applying Support Vector Regressor and Linear Regressor it was found that Support Vector Regressor had better confidence or accuracy score for 'FB' stock. The confidence score for SVR came to approx. 0.88 and for LR, it came to approx. 0.74. Based on this score, values were predicted for both SVR and LR.

Comparison

Now, in continuation of the work done earlier, all four SVR i.e. linear, polynomial, sigmoid and Radial Basic Function's prediction performance will be calculated and compared with the help of program written in python language and also, the prediction model will get its validation with implementation of support vector regressor. In order to find best fit model, plot it with the help of graph as shown below. Here, the orange line shows the results obtained from linear SVR, blue line shows results obtained from polynomial SVR, black line shows the results obtained from sigmoid regression and green lines shows the results obtained from RBF-SVR. Red dots represent the real values of a particular stock.

It is clear from the figure 4, that the result obtained from radial basic function is nearest to the real values i.e. the green line covers maximum number of red dots. Hence the results obtained from radial basic function are better.

The black line covers the least number of red dots and hence the results obtained from sigmoid regression are not satisfactory. Moreover, these results depends upon the value of degree, gamma etc.

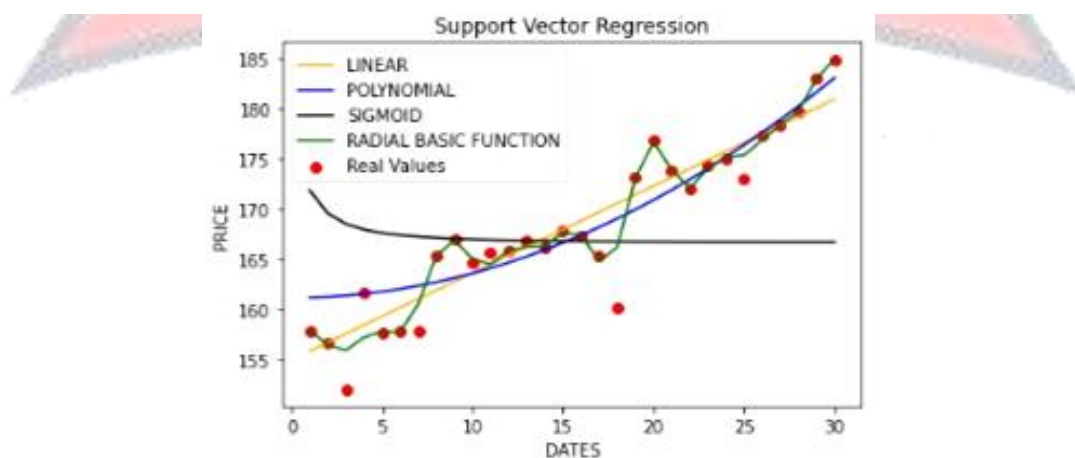


Figure 4: Showing the Performance of Radial Basic Function is better than the Other Three

Conclusion

Out of Linear regression and support vector regression, support vector regression has better performance as the values predicted are nearest to the real ones and hence it provides the better confidence value. Moreover, in the comparison of support vector regressors, the figure 4 shows that the result obtained from RBF-SVR is closer to real values and hence it has the better prediction results than the linear, polynomial and sigmoid Support Vector Regressor.

REFERENCES

- [1] S. N. Balaji, P. V. Paul, and R. Saravanan, "Survey on Sentiment Analysis based Stock Prediction using Big data Analytics," *International conference on Innovations in Power and Advanced Computing Technologies*, pp. 1–5, 2017.
- [2] R. Bansal, "Relation between Political Events, Union Budgets and Index Return: Empirical Evidence from the Indian Stock Market," *International Journal of Accounting Research*, vol. 5, no. 2, pp. 1-10, 2017.
- [3] V. Sandhiya, T. Revathi, A. Jayashree, A. Ramya, S. Sivasankari, " Stock Market Prediction on Big data using Machine Learning Algorithm ", *International Journal of Engineering Science and Computing*, vol 7, no.4, pp. 10057-59, 2017.
- [4] Prit Modi, Shaival Shah, Himani Shah, "Big data analysis in Stock Market Prediction", *International Journal of Engineering Research and Technology*, vol. 8, no. 10, 384-386, 2019.
- [5] Internet Source: Available at:
<https://stackoverflow.com/questions/41656290/support-vector-machine-python-3-5-2?rq=1>.
- [6] Internet Source: Available at:
<https://stackoverflow.com/questions/42667378/erroneous-prediction-of-stock-prices>
- [7] Zhihao PENG, "Stock Analysis and Prediction using Big Data Analysis", *International Conference on Intelligent Transportation, Big Data & Smart City, IEEE*, pp-309-312, 2019.
- [8] D. Raut, U. Shinde, D. Malathi, "Machine Learning Approach in Stock Market Prediction," *International Journal of Pure and Applied Mathematics*, vol. 115, no. 8, pp. 71–77, 2017.