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Development of Stock Market Analysis and Prediction Methods with Help of Support Vector Machine Algorithm

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Abstract: ***With so many individuals investing these days, it is crucial to utilise financial forecasts wisely while making investment choices. This might assist investors in creating portfolios that optimise profits while lowering risks. Because not all investments come with a strong return guarantee owing to complexity, lack of information, and lack of abilities, it is very difficult to make predictions. Because of this, we use Support vector Machine to forecast stock.***

Keywords: Stock Market, Support Vector Machine, Machine Learning

1. Overview

The earnings from stock are a kind of corporate ownership that are dependent on the future performance of the company and represent claims on its assets. It is difficult to predict tomorrow's closing price due to brokers' ignorance of stock market closing prices. SVM outperforms other machine learning approaches in terms of stock market prediction [4]. SVM makes an effort to build a model from a set of training examples. The trained SVM model should be tested with new data examples to identify which category the new data examples belong to based on the training results. Two types of Support Vector Machine are used that is linear and nonlinear. It is fast to train and execute, linear SVMs often perform badly on challenging datasets with plenty of training inputs and few features. Because they may perform better over a broader variety of problems, nonlinear SVMs are often preferred; nevertheless, they lose part of their teaching potential.

2. Review of Literature Overview of SVM

We predict and categorise data using machine learning, utilising various techniques based on the dataset. Support Vector Machine, sometimes referred to as SVM, is a linear model for problems with regression and classification. It can handle both linear and non - linear challenges and performs well for many real - world applications. Simple Variable Model (SVM) algorithms split data into groups by drawing lines or hyperplanes.

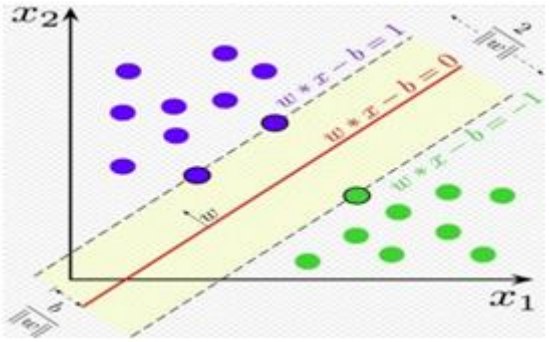

Figure 1.1: Support Vector Machine

To identify a maximum marginal hyperplane (MMH), the datasets must first be divided into classes. This may be done in the following two steps:

The SVM will first repeatedly produce hyperplanes that best separate the classes, and then it will choose the hyperplane that does so.

3. Research Models

Step 1: - Data extraction is the first step in this process, and we utilised a Python library called Pandas to pull data from a variety of websites. Pandas automatically transforms the data gathered from the web into organised 2D Frames and stores them.

```
In [55]: Data = pd.read_csv("AAPL.csv")
         Data.head()
```

Out[55]:

	Date	Open	High	Low	Close	Adj Close	Volume
0	2013-01-02	79.117142	79.285713	77.375717	78.432854	68.687538	140129500
1	2013-01-03	78.268570	78.524284	77.285713	77.442856	67.820526	88241300
2	2013-01-04	76.709999	76.947144	75.118568	75.285713	65.931404	148583400
3	2013-01-07	74.571426	75.614288	73.599998	74.842857	65.543602	121039100
4	2013-01-08	75.601425	75.984283	74.464287	75.044289	65.719994	114676800

Figure 1.2: Data Extraction

The most crucial step in machine learning is training since overall predictions are based on prior performance. STEP 2: Plotting The Data To Be Trained: -

Support Vector Regression (SVM) is being used to train the model, and the sole input is the stock's closing price.

Step 3: Classifying the Dependent and Independent Datasets: - This dataset is divided into Dependent and Independent data sets.

STEP 4: Training The SVM Model: - In general, training uses 80% of the dataset (Dependent & Independent), whereas end testing uses 20%. The dataset is trained using the radial basis function (rbf), which has higher accuracy than the other two Support vector Machine models (linear and polynomial models).

STEP 5: The kind of dataset utilised and the quantity of historical data provided to the model determine how long it will take to test the model overall. The last stage before the final result is to assess the model's accuracy level, which is supplied by SVM confidence, after a successful training. The ideal accuracy is always 1.0 (100%) and no algorithm can achieve it. However, we may attempt to get the closest value.

STEP 6: - End Prediction - As can be seen in the picture below, the svr rbf model has now been connected to all 80% of the training data and 20% of the testing data, and the x - forecast (Stock Prices) is being ignored by the. predict () function for the next 30 days.

```
[257.49940778 215.05304989 240.48165486 294.94297702 284.02945574
 281.65598935 237.87790854 291.49366068 195.74322274 210.7502518
 292.93822424 278.58028342 281.26518921 262.99464896 165.71718508
 220.43091083 183.3456025  165.5771938  164.50604115 163.79828365
 163.79722929 163.79722928 163.79722929 163.79722929 163.7972293
 163.79722928 163.79722928 163.79722928 163.79722928 163.79722928]
```

Figure 1.3: End Prediction for SVM

The graph created with the MatPlotLib. pyplot machine learning library, as shown below, allows us to see the whole process of training, testing, and prediction

```
#Plot the data
train = data[:training_data_len]
valid = data[training_data_len:]
valid['Predictions'] = predictions
#Visualize the data
plt.figure(figsize=(16,8))
plt.title('Model')
plt.xlabel('Date', fontsize=18)
plt.ylabel('Close Price ($)', fontsize=18)
plt.plot(train['Close'])
plt.plot(valid[['Close', 'Predictions']])
plt.legend(['Train', 'Val', 'Predictions'], loc='lower right')
plt.show()
```

Figure 1.4: Process for prediction, Training, Testing

In the model below, the train curve is shown by the colour blue, the testing value curve by the colour red, and the forecast value is indicated by the colour yellow.

Ref no	Year	Author	Research Paper Name	Publisher Name	Research
[1]	2019	Kunal pahwa, Neha Agarwal	Stock Market Analysis using Supervised Machine Learning	Institute of Electrical and Electronics Engineers (IEEE)	In this study, the data was first trained using the features and labels that were extracted, and then the models were evaluated using the same data. When the data was prepared, it was sent into the classifier as an input. The most straight forward classifier, i. e. a linear regression.
[2]	2020	Yuling LIN, Haixiang GUO and Jinglu HU	An SVM - based Approach for Stock Market Trend Prediction	Institute of Electrical and Electronics Engineers (IEEE)	In this study, a quasi - linear SVM is paired with a correlation - based SVM filter approach.
[3]	2020	Srinath Ravikumar, Prasad Saraf	Prediction of Stock Prices using Machine Learning (Regression, Classification) Algorithms	Institute of Electrical and Electronics Engineers (IEEE)	The extracted raw data is saved as a dataset. Training and test data sets have been created from the dataset. Both the test dataset and the training dataset are utilised to train the model. The test data values are projected, and the outcomes are assessed.
[4]	2019	Elijah Joseph , Amit Mishra, Idris Rabiu	Forecast on Close Stock Market Prediction using Support Vector Machine (SVM)	International Journal of Engineering Research & Technology (IJERT)	This study used data that was divided into training and test models, normalised the data, and trained an SVM model to forecast closing prices. After training, the model was put to the test outside, and the results were recorded.
[5]	2020	Prof. Jogi John, Aatish Kumar, Ankit Abhishek, Tejas A. Dhule, Amit Roy, Abhishek Jha	Stock Market Prediction using Machine learning	International Journal of Research and Analytical Review (IJRAR)	Data is gathered from the web via web scraping in this research study, and stock closing prices are used to train our model. We split the data into training and testing sets and train the dataset using the radial basis function (rbf)

Date	Close	Predictions
2018-08-07	207.110001	216.218246
2018-08-08	207.250000	218.583771
2018-08-09	208.880005	220.522186
2018-08-10	207.529999	222.191788
2018-08-13	208.869995	223.404221
...	...	...

Figure 1.5: Closed and Predicted values

The overall process is mentioned in this form

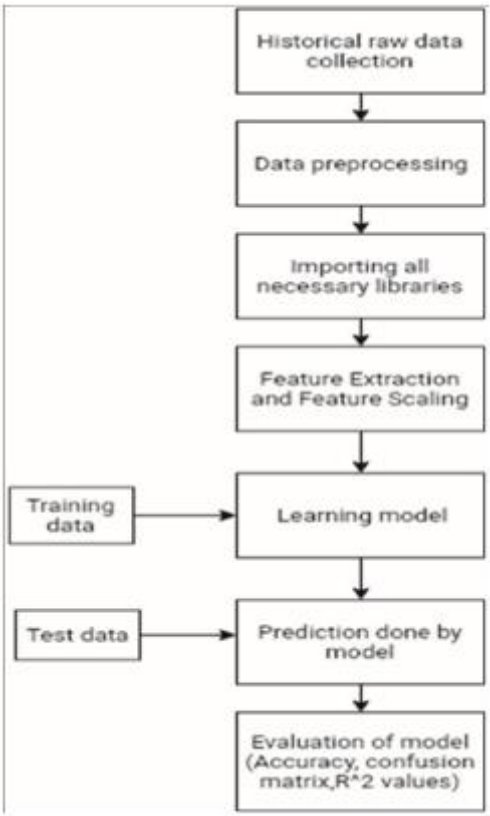

Figure 1.6: Overall Process

4. Result

Figure 1.7: Predicting Stock Prices

5. Conclusion

We have attempted to provide an efficient & practical use of machine learning, namely prediction, in this project. We have seen how machines may optimise themselves depending on developer supervision. Everyone has always found the stock market to be a highly fascinating subject since, with a little understanding, one may increase one's company earnings. We have thus offered a straightforward approach that might assist investors in deciding whether or not to spend their money in the firm or organisation they choose. As of now, we have discovered the following things, which will determine our final conclusion. The RBF (Radial Basis Function) kernel of the three Support Regression models is the most robust SVM's efficiency/confidence value rises as training period experience grows in depth. By including future elements like sentiment analysis conducted on individuals connected to the company whose predictions are created, future efficiency may be significantly increased. As a result, any changes to future projects will undoubtedly surprise us all at a higher level if machines begin to understand not just the organization's history but also what could occur in the future.

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