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Exploring the Benefits of Support Vector Machines for Stock Prediction

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Abstract: This study has been undertaken to investigate the determinants of stock returns in Karachi Stock Exchange (KSE) using two assets pricing models the classical Capital Asset Pricing Model and Arbitrage Pricing Theory model. To test the CAPM market return is used and macroeconomic variables are used to test the APT. The macroeconomic variables include inflation, oil prices, interest rate and exchange rate. For the very purpose monthly time series data has been arranged from Jan 2010 to Dec 2014. The analytical framework contains**.**

Index Terms **- SVM, STOCKS, MACHINE LEARNING, PREDICTION, RELIANCE STOCK and ACCURACY.**

I. INTRODUCTION

The global stock market is made up of multiple stock exchanges, where people can buy and sell shares in various companies. The price of shares is determined by the law of supply and demand, with buyers looking to purchase at the lowest price possible and sellers aiming to sell at the highest price possible. The largest stock exchange is the New York Stock Exchange (NYSE), with over $30 trillion market capitalization. The stock market is a vital platform for raising funds, and it is highly liquid, making buying and selling securities easy. Increasing participation in the stock market is a crucial feature of emerging economies.

It discusses three machine-learning algorithms used in stock prediction: ANN, SVM, and LSTM. ANN is used to understand complex issues beyond basic machine learning algorithms, SVM is effective for high-dimensional classification problems and serves as a risk management tool for investors, and LSTM is a popular recurrent neural network used to learn order dependence for solving sequence prediction problems. Time series models are commonly used to predict stock prices, as stock market data is presented in time-series format. This project in particular uses SVM on Reliance stocks.

II. LITERATURE SURVEY

The field of stock market prediction involves various methods, including Artificial Neural Networks (ANNs), Support Vector Machines (SVMs), and Long-Short Term Memory (LSTM). ANNs use mathematical equations to process input data and generate outputs. They typically have three layers, including an input layer, a hidden layer, and an output layer, with the hidden layer being crucial for filtering relevant data and patterns. ANNs have been found to be effective at modeling volatile and non-constant data such as stock market trends.

In general, ANNs have been found to be useful tool for predicting stock market trends, but the accuracy of the predictions depends on various factors, including the quality of the input data, the choice of the algorithm, and the parameters used in the model. Therefore, it is essential to consider the strengths and limitations of different techniques when selecting the most appropriate approach for predicting stock market trends.

III. EXISTING SYSTEM

Artificial neural networks (ANN) have been the main focus of the majority of machine learning forecasting research. ANNs are constructed by a network of connected nodes that replicate individual neurons. These nodes are arranged into several functional layers, such as input, processing, output, and so on. The ANN gives connection weights; the output is computed using the inputs and weights. Although ANNs are reliable when there are no abrupt changes in the data. And it has been demonstrated that prediction is challenging even with cutting-edge techniques like ANNs because the stock market data varies so significantly over time and non-linearly.

IV. PROPOSED SYSTEM

Support vector machines (SVM) are used in the suggested system to address the issue of accurate prediction owing to volatility, which is present in artificial neural networks (ANNs). Support vector machines, a new method, and promises to respond to volatility and generate significantly more precise outcomes.

V. PURPOSE OF THE PROJECT

- The Main Objective of this Project is to find out the Predictive Capabilities of the SVM model on stocks.
- And see if SVM Model is Practical for everyday stock prediction by taking a recent dataset.
- The project's objectives are to gather and pre-process historical stock market data, extract pertinent characteristics from the data, train the SVM model, and assess the model's effectiveness using a variety of performance indicators.

VI. SYSTEM ARCHITECTURE

The system architecture is to create an accurate and robust SVM model that can predict stock market trends with high accuracy and consistency, allowing investors to make informed decisions about their investments.

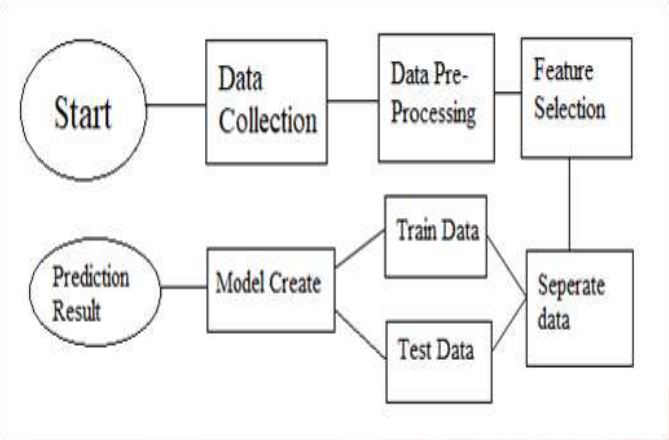

Fig 1: System Architecture

Our project follows this architecture, where the process starts with data collection to find the right dataset for effective model training and testing. Then the data set is preprocessed so that it can be used for training and testing the model. The dataset consists of many features, and you can choose to select a few of these features and discard the rest so as to use less memory or storage. Next, we have to split the dataset so that part of it can be used for training the model and the other part is used to test the model. Finally, the model is trained using the largest open-source machine learning library, sklearn. Then the model is tested for evaluation (to find its accuracy).

The system architecture for stock prediction using SVM typically involves the following steps:

1. INPUT: In each machine learning project, the dataset, which serves as the project's input, is essential to successfully training the model. We utilise a Python library called pandas to work with datasets. The pandas programming language's read (function is used to load the dataset.

2. DATASET: The dataset used in this project is reliance (2020-09 to 2021-09), which was acquired from yahoo finance. The dataset is essential to model training, as was already mentioned. The dataset included items like the stock price at the day's beginning and closing.

3. SPLITTING THE DATA: Next, the dataset is split into training and testing sections, with the former being used to train the model and the latter to test and assess the model. Before being used, the dataset is pre-processed. Indexing the data as part of the pre-processing step makes time-slicing processes significantly simpler.

4. PREDICTION: After being trained on past stock market data, the SVM model is then used to predict new and unanticipated data, such as upcoming stock prices.

5. TRAINING MODEL: In this project, the model is trained using SK-learn, the largest machine learning library for Python. One of the many applications for this open-source library is the support vector classifier, which implements the support vector machine technique.

5. OUTPUT: A predictor variable that indicates whether or not to buy a stock is the project's final output. For our convenience, we also created a visual graph of the actual returns and expected returns using the Python tool matplotlib.

VII. RESULT

The raw results of a machine learning project are the model's accuracy. And for this project, we found an average accuracy of 56%. And a 50+% can be viewed as effective because the stock can only move up or down, which translates to 50% accuracy, and our model, which gives an accuracy of 56%, is much better.

The graph below displays the accuracy (Original Result vs. Predicted Result) visually**.**

Figure 2: OUTPUT

Table -1: Predictive Variable

Date	Open	High	Low	Close	Adj Close	Volume	Open-Close	High-Low	Predicted_Signal
2020-09-11	2312.000000	2337.000000	2287.100098	2319.750000	2305.370605	27440700	-7.750000	50.750000	1
2020-09-14	2325.000000	2360.000000	2282.000000	2302.550049	2288.277100	30335273	22.449951	78.000000	0
2020-09-15	2311.949951	2325.750000	2289.149902	2319.699951	2304.479736	12542824	-8.000147	37.600098	1
2020-09-16	2320.000000	2340.300049	2310.550049	2324.550049	2310.149902	10869978	-4.550049	29.750000	1
2020-09-17	2320.000000	2333.000000	2291.850098	2299.750000	2284.560732	11918927	21.250000	41.149902	1
...	...	...	...	...	...	...	...	...	...
2021-09-02	2355.000000	2397.800049	2355.000000	2394.389893	2387.512939	4505949	-39.389893	42.800049	1
2021-09-03	2370.000000	2385.000000	2352.000000	2386.000000	2381.330566	14101923	-16.000000	33.000000	0
2021-09-06	2413.000000	2480.000000	2412.000000	2420.000000	2416.219482	10525944	-7.000000	68.000000	1
2021-09-07	2430.000000	2455.000000	2412.000000	2440.000000	2433.572998	6506908	-10.000000	43.000000	1

```
#Import svm model
from sklearn import svm

#Create a svm Classifier
clf = svm.SVC(kernel='linear') # Linear Kernel

#Train the model using the training sets
clf.fit(X_train, y_train)

#Predict the response for test dataset
y_pred = clf.predict(X_test)

#Import scikit-learn metrics module for accuracy calculation
from sklearn import metrics

# Model Accuracy: how often is the classifier correct?
print("Accuracy:",metrics.accuracy_score(y_test, y_pred))
```

```
Accuracy: 0.56
```

Figure 3: Accuracy of the model

VIII. CONCLUSION AND FUTURE SCOPE

The main goal of the study was to evaluate an SVM (Support Vector Machine) model's ability to predict the future direction of the stock market. Following extensive testing on various datasets and a number of trials, it was discovered that the model had an average accuracy of 56%. The SVM model was able to reliably anticipate stock market movements to a large degree, which is a level of accuracy that is typically regarded as useful for machine learning models.

However, a more thorough examination of the model's output demonstrated that there was still room for development. More granular stock price data, which would give more thorough information on the minute-to-minute swings in stock prices, could specifically improve the model's prediction skills. As a result, the model would be able to identify more subtle patterns and trends that might be applied to enhance its ability to predict.

Further examination of the model's performance, however, revealed that there was still space for development. More precise stock price information might be used to improve the model's estimating skills because it would give more information on the minute-to-minute swings in stock prices. This would enable the application to identify subtler patterns and trends that might be used to enhance its predictions.

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