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Stock Market Prediction

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Abstract

Researchers have been investigating various approaches to accurately forecast stock market prices. Trading professionals can gain better insights regarding data, such as potential trends, by using useful prediction tools. Additionally, since the study predicts future market conditions, investors stand to gain significantly. Using machine learning algorithms for predicting is one such approach. The goal of this study is to increase the accuracy of stock market predictions made using stock valuation. Many academics have developed various approaches to address this issue, primarily using conventional approaches up to this point, like artificial neural networks, which are ways to identify hidden patterns in data and classify it for use in stock market prediction. This initiative suggests a fresh approach to stock forecasting.

Keywords: Market Prediction, National Stock Exchange, Bombay Stock Exchange.

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Introduction

Stock Price Forecast The stock market is one of the most well-liked investments because of its huge returns. As trading and investing became more common, people looked into strategies and equipment that would maximise their gains while avoiding risk. The majority of trading on the Indian stock market is conducted on two stock exchanges, the National Stock Exchange (NSE) and the Bombay Stock Exchange (BSE). The two important Indian Market Indices are Sensex and Nifty. Because stock market prices are always changing, making predictions about them is difficult.

A few forecasting models have been developed for this kind of purpose throughout the very recent years and have been used to predict the money market.

This classification is typically carried out using:

1. Time series analysis
2. Fundamental investigation
3. Technical assessment

Literature Survey

Forecasting Stock Prices Using Yahoo Finance Data and Analysing Seasonal and Nonseasonal Trends:

Publication Year: 2018

Jai Jagwani, Hardik Sachdeva, Manav Gupta, and Alka Singhal are the Authors.

Title of Journal: 2018 IEEE Summary:

The main goal of the suggested work is to identify the [2] relationship between various existing time series algorithms, specifically ARIMA and Holt Winter, and stock prices. By analysing a good risk-free range of stock prices, a model's accuracy can be improved and a good range of stock prices for investments can be identified. Combining two independent time series analysis algorithms and offering a choice of pricing to the stock market consumer allows for the discovery of distinctive results for shares. The key benefit of these models is their simplicity and estimation of values that are solely dependent on historical stock prices for seasonal or non-seasonal data. The work that isn't taken into consideration and other restrictions are some of the limits in this experiment.

Machine Learning-based Prediction of the Stock Market: 2018

Ishita Parmar, Ridam Arora, Lokesh Chouhan, and Navanshu Agarwal are the Authors.

Himanshu Dhiman, Shikhin Gupta, and Sheirsh Saxena

2018 IEEE Journal Name Summary:

The application of regression and LSTM-based machine learning to forecast stock prices is studied in this work [3]. The variables open, close, low, high, and volume are all measured. The goal of this paper was to use machine learning techniques to more accurately and reliably forecast the future prices of a company's stock. The LSTM algorithm produced a favourable conclusion with greater stock price prediction accuracy.

Prediction of Multi-Category Events-Driven Stock Price Trends:

Year of Publication: 2018

Youxun Lei, Kaiyue Zhou, and Yuchen Liu Wrote this.

Title of Journal: 2018 IEEE Summary:

In this study, a model for predicting stock price trends is developed using [4] multi-category news events as characteristics. The multi-category events are built on a feature word dictionary that has already been created. Additionally, we have used SVM models and neural networks to analyse the connection between stock price changes and certain multi-category news. The predetermined multi-category news events are more effective at predicting stock price trend than the standard bag-of-words feature, according to experimental data. According to this study, short-term prediction is superior to long-term prediction.

Utilizing Machine Learning, Predict Share Price:

Publication Year: 2018

Jeevan B, Naresh E, Vijaya Kumar B P, and Prashanth Kambli are the Authors.

Title of Journal: 2018 IEEE Summary:

This paper is primarily [5] based on the method of predicting the share price using Long Short Term Memory (LSTM) and Recurrent Neural Networks (RNN). It forecasts the stock value on NSE data using a variety of factors, including the current market price, price-earning ratio, base value, and other anonymous events. By comparing the genuine data with the predicted data using an RNN graph, the effectiveness of the model is evaluated. Machine learning can be used to predict stock prices, as demonstrated by the model's ability to do so with a high degree of accuracy. The model captures detailed feature information and employs a variety of prediction techniques. The model learns to recognise and categorise all of the NSE data from the internet.

2016 Marks the Year of Publication for "Stock Market Prediction Using Machine Learning Techniques."

Mehak Usmani, Syed Hasan Adil, Kamran Raza, and Syed Saad Azhar Ali are the Authors.

Journal: IEEE Summary, 2016:

The main objective of this project is to [6] use machine learning techniques to predict market performance of the Karachi Stock Exchange (KSE) on day close. By applying the predictions model, a variety of attributes as an input and market forecasts as Positive & Negative are projected. The model's features include news feeds, foreign exchange (FEX) rates, interest rates, gold and silver rates, oil prices, and rates for gold and silver. The Single Layer Perceptron (SLP), Multi-Layer Perceptron (MLP), Radial Basis Function (RBF), and Support Vector Machine (SVM) machine learning techniques are contrasted. In comparison to other techniques, the multi-layer perceptron algorithm, or MLP, performed the best. The oil rate element was the most beneficial characteristic for market forecasting. The study's findings demonstrate that machine learning methods can accurately forecast stock market performance. The machine learning Multi-Layer Perceptron algorithm correctly forecasted market performance to a 70% accuracy.

LSTM Neural Network-based Stock Price Forecasting in Two Different Ways

Publication Year: 2019

Jingyi Du, Qingli Liu, Kang Chen, and Jiacheng Wang are the Authors.

2019 IEEE Journal Title: Summary

In order to validate the forecast effect of the model on stock time series, the [7] LSTM neural network is used to predict Apple stocks using single feature input variables and multi-feature input variables. The experimental findings demonstrate that the model is accurate and in line with the actual demand, with a high accuracy of 0.033 for the multivariate input. The projected squared absolute error for the single-variate feature input is 0.155, which is worse than the multivariate feature input.

Forecast of the Share Price Trend Combining LSTM Structure and CRNN:

Publication Year: 2018

Shao-En Gao, Bo-Sheng Lin, and Chun-Mu Wang are the Authors.

IEEE Summary 2018, the Name of the Journal:

The stock market dominates the [8] entire financial market, and one of the most alluring study topics is forecasting stock price volatility. In order to determine an approximate trend value for the stock prices discussed in this research, deep learning method and historical stock information are both used. This study uses a neural network to predict future stock prices in addition to storing historical stock data using a time scale. This is done since stock trends are frequently correlated with historical stock price data. The convolutional recurrent neural network (CRNN) and the long short-term memory (LSTM), which improve the long-term reliance of standard RNN, are the two main components of the neural network design that is proposed in this research. The RNN LSTM architecture is also used to improve prediction stability and accuracy. This study compiles a total of 10 historical stock prices in order to test and achieve an average error rate of 3.449 RMSE.

Application of Long Short Term Memory Neural Networks to Stock Closing Price Prediction:

Publication Year: 2017

Author: Yi Liu, Yueting Chai, and Tingwei Gao

Name of Journal: 2017 IEEE Summary:

The main goal of this research is to [9] evaluate the approach that combines RNNs with informative input data, which can provide an improved and efficient method to forecast the next-day market. Long-short memory (LSTM) and stock fundamental trading data are used in the analysis of the stock prediction model. The case study is based on Standard & Poor's (S&P500) and NASDAQ. Their forecasting approach for the following day exceeds the comparison models and provides a more accurate prediction of the closing price of the stock. The case study's key finding is this. They examine five different models, including the moving average (MA), exponential moving average (EMA), support vector machine (SVM), and LSTM, to show the system's usefulness. The predicted objective is the closing value of the following day.

Construction of a Prediction Model for Stock Analysis:

Year of Publication: 2017

Authors: Dr. C. Dhaya and R. Yamini Nivetha

IEEE Journal of 2017 Summary:

The primary goal of this study is to compare the three algorithms Multiple Linear Regression (MLR), Support Vector Machine (SVM), and Artificial Neural Network (ANN). The daily prediction and the monthly prediction will be used to establish the price of the market for the upcoming day. The best prediction algorithm for sentiment analysis predicts stock price. The Multiple Linear Regression algorithm, which determines the association between volume and stock price, is the less-developed algorithm.

The study's findings demonstrate that deep learning algorithms are more advanced than MLR and SVM algorithms.

Related Work

To predict the future value of a stock, machine learning techniques like LSTM are currently used in stock price prediction. The goal of this machine-learning algorithm is to provide the most accurate stock price predictions possible. In this proposed system, LSTM is capable of detecting changes in the stock price's behaviour over the specified period.

Drawbacks

Due to the algorithm's bootstrap sampling foundation, the current technique is ineffective when there are uncommon outcomes or predictors.

The prior findings suggest that when the conventional classifier is applied, the stock price is uncertain.

The existence system reported highly predictive values after carefully choosing the right time frame for their experiment to provide highly predictive results.

Proposed System

We developed the "Stock Market Price Prediction" system and used the LSTM-CNN algorithm to forecast stock market prices. In the suggested approach, we were able to teach the computer to predict the future using a variety of historical data points. To train the algorithm, we used information from stocks from the prior year.

To solve the challenge, we primarily used two machine-learning packages. The first one was numpy, which was used to prepare the data for analysis by cleaning and manipulating it. Scikit, on the other hand, was employed for accurate analysis and forecasting.

Advantages

Greater precision with LSTM-CNN.

When the conventional classifier is applied, the stock price can be predicted with ease.

Module Description

1. Data Collection

Data gathering is a highly fundamental module and the project's first stage. It typically has to do with gathering the appropriate dataset. The dataset that will be utilised to anticipate the market must be vetted based on a number of criteria. By including more external data, data collecting also aids dataset enhancement. Stock prices from the prior year make up the majority of our data. In order to examine the predictions accurately, we will first analyse the Kaggle dataset and use the model with the data in accordance with the accuracy.

2. Pre Processing

Data pre-processing is a step in the data mining process that involves converting unstructured data into something more comprehensible. Raw data typically contains numerous inaccuracies, is inconsistent, or is both. Checking for missing values, looking for categorical values, dividing the dataset into a training and test set, and then doing feature scaling to narrow the range of variables so that they may be compared on similar environments are all part of the data pre-processing.

3. Training the Machine Training

To adjust the test data, the machine works similarly to supplying the data to the algorithm. To fine-tune and fit the models, training sets are used. The test sets are unaltered since it is improper to evaluate a model using hypothetical data. Cross-validation is a step in the model training process that allows us to obtain a reasonable estimate of the model's performance based on the training set of data. The purpose of tuning models is to fine-tune the hyperparameters, such as the number of trees in a random forest. On each set of hyperparameter values, the whole cross-validation cycle is executed. We will next determine a cross validated score for each set of hyperparameters. Then, we decide which hyperparameters are the best. The objective behind training the model is to select some initial values from the dataset before optimising the desired model parameters. Repeating this till we have the ideal values. So, using the inputs from the test dataset, we use the predictions from the trained model. As a result, it is split in half, 80:20, with 80 percent going to the training set and the remaining 20 percent going to the testing set of data

4. Data Scoring

Scoring the data is the process of using a predictive model on a set of data. LSTMCNN uses an ensemble approach, which is typically utilised for both regression and classification. We achieve intriguing outcomes using the learning models. Thus, the final module explains how the model's output might help anticipate the likelihood that a stock will rise or fall based on particular parameters. It also demonstrates the weaknesses of a specific stock or organisation. To ensure that only authorised entities have access to the results, a user authentication system control is in place.

Conclusion

In this project, we will contrast various machine learning models, including the LSTM, CNN, and hybrid models that combine the LSTM and CNN models. To anticipate the future value of a stock, we frequently train the model using data from NSE-listed businesses. This demonstrates that the suggested method can be used to distinguish between data relationships. Additionally, it is clear from the results that the hybrid LSTM+CNN model technique is able to detect changes in trends. The Hybrid strategy of LSTM+CNN is regarded as the best model for the projected method. It makes predictions using the data available at a certain moment. Even though the other two models, LSTM and CNN, are frequently used in other time-dependent data analyses, in this instance they do not outperform the hybrid LSTM+CNN architectural approach. This frequently happens as a result of the stock market's rapid movements. The stock market's fluctuations don't always follow a consistent cycle or a regular pattern. The duration of trends' existence and how long they last will vary depending on the firms and industries. The examination of these cycles and patterns can increase the returns on investment for investors. To increase the accuracy of forecasted stock prices, we will incorporate more stock market data and compare more models in next work.

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