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Stock Market Trading Framework using deep learning.

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Abstract:

Stock market forecasts have always been the focus of experts in this and related fields. Over the years, many modern techniques have been used in conjunction with previously available statistical models to find better predictive techniques. Among modern technologies, machine learning and specifically artificial intelligence holds the greatest share of predictive models on the market. Compared to other techniques, deep learning techniques showed better results in modelling market movements. Some techniques have been tried and tested individually but with unsatisfactory results, these techniques include automatic feature extraction, time series prediction, recurrent neural network (RNN), etc.

However, hybrid frameworks with multiple inputs and based on deep learning methods such as RNN and LSTM (Long Short-Term Memory) have not been studied much. We propose a recurrent neural network (RNN)-based framework that combines with long-short-term memory (LSTM) to predict the stock market closing price. The RNN-LSTM framework extracts features from a rich feature set and applies time series modelling to predict what will happen next. The set includes raw price data for the target index as well as foreign indices, technical indicators, exchange rates, and commodity price data, all selected by protocol and price configurations. known in the industry. Now let's come to the LSTM (Long Short-Term Memory) part, which is known for its series forecasting. LSTM is greatly helpful in time series forecasting. A correct price forecast will bring huge benefits to users of our framework/model. Successfully predicting the future price of a stock can bring substantial profits.

Keywords— Long Short-Term Memory, Recurrent Neural Network (RNN), Deep Learning, Machine Learning, Artificial Intelligence.

I. INTRODUCTION

Stock exchange refers to a set of markets and exchanges where economic activity takes place, such as: B. the purchase, sale, and placement of shares in public companies. These financial practices are conducted through formalized, institutionalized trading in over-the-counter markets that operate under a specific set of rules. The stock market is a very dynamic and uncertain industry, so stock market predictions naturally become a hot topic. Thanks to recent advances in computing power, stock market predictions have become much faster and more accurate.

Artificial intelligence and machine learning models play a key role in predicting stock prices and thereby determining an accurate outcome. The stock market is dependent on various parameters like stock market value, company performance, government policies, gross domestic product (GDP), inflation rate, natural disasters etc. Many tools are used to achieve exactly these goals of the project Deep Learning Studio (software) is a great place to start, especially for beginners in the field, since it allows you to easily create different neural network models to see which one works best for time series forecasting.

Regarding the model and the languages to use, Python will look for careful research of the programming language used for the implementation will be particularly useful due to its flexibility and the availability of ready-made models and open-source libraries that can help us achieve our goal and maybe even improve our results. Also, this document provides a simple example of the most appropriate model (that gives the best results) for time series forecasting, which is certainly the LSTM model, which stands for Long Short-Term Memory.

II. PROBLEM STATEMENT

Predicting stock prices has always been a challenge for many trading analysts and researchers. In fact, forecasting stock prices is an interesting area of research for investors. In order for investments to be successful, many investors want to know the future market situation. Successful forecasting systems help traders indirectly by providing additional information such as the future direction of the market. Among the modern technologies, machine learning and artificial intelligence in general have been the basis of many market forecasting models. Deep learning techniques in particular have proven their worth in modelling market movements. We propose a framework based on a convolutional neural network (CNN) combined with a long-term memory (LSTM) to predict the closing price of the Nifty 50 stock index networks showing an average error loss of 20%. We will see if it is possible to develop a recursive neural network model that predicts the stock price with a lower error rate. And if the answer

is YES, we will also see how reliable and efficient this model will be.

III. LITERATURE SURVEY

Stock price prediction is a challenging task due to the complex and dynamic nature of markets. Stock markets have great impact on a country's economy [2]. Organizations are using different machine learning technologies for this purpose. These technologies have provided with results which could be improved using evolving modern technologies like deep learning. A short review of available research is given below.

The authors [1] conducted a comprehensive review of recent studies that employed various machine learning techniques for stock price prediction. The review included studies that used regression, decision trees, neural networks, and support vector machines (SVMs), among other methods. The authors provided an overview of the datasets, pre-processing techniques, model architectures, and evaluation metrics used in the studies. They also discussed the strengths and weaknesses of each method and identified several research gaps and future directions. Another researcher [3] conducted a comparative study of various machine learning methods for stock price prediction. The study included regression, decision trees, SVMs, and neural networks, among other methods. The proposed models were evaluated on a dataset of US stock prices, and the neural network-based models outperformed the other methods.

Machine learning-based techniques [5, 6, 10, 15] have shown promising results for stock price prediction. The reviewed studies have shown that different machine learning methods, such as regression, decision trees, SVMs, neural networks, and ensemble learning, can effectively capture the complex patterns in the input data and achieve high prediction accuracy. However, there are still several challenges in using machine learning for stock price prediction, such as data quality, model interpretability, and overfitting. Further research is needed to address these challenges and improve the accuracy and reliability of stock price prediction models.

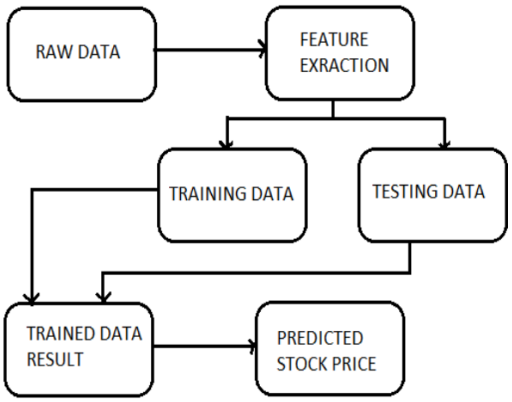
Deep learning [4, 7] techniques have shown so far, the best results when it comes to predicting stock prices. ANN (artificial neural network) [9] have better results when compared with different traditional machine learning methods. The results can be further improved using time series analysis and RNN (recurrent neural network) [13]. So, we have decided to use RNN's LSTM model for our project.

Summary of Literature Survey:

Here, we have reviewed various approaches for Stock price prediction. All approaches have their own advantages and disadvantages. LSTM is a most popular algorithm to prediction the stock price but there are some challenges in this method like use to need a lot of training data, High computational cost, without GPU data quite slow to train, depend on any previous information for prediction. A hybrid approach can be used to overcome these issues. While machine learning is able to provide highly accurate prediction result using standards tool and also outperforms all standard prediction methods.

IV. Proposed system

Below figure shows the system architecture for your project. Getting historical data for stock market is the first mandatory step. Feature extraction is done on the raw data to make it suitable. Division of data into training and testing data, training the data to predict the closing price of the given stock followed with last step of visualization of data.



The typical LSTM unit consists of a cell, an info door, an entrance door and a door with a view. The cell collects values over discretionary time intervals, and the three inputs manage the progress of data into and out of the cell. The main advantage of the LSTM is its ability to learn context-specific temporal dependence. Each LSTM unit collects information for either a long or short period of time (hence the name) without explicitly using the activation function within the recurrent components. A significant certainty to note is that any cell state is uniquely increased by the output of the overlooked entryway, which changes somewhere in the range of 0 and 1. In other words, the overhead door in the LSTM cell is responsible for both the loads and the capacity to initiate the cell state. Subsequently, data from a past cell state can pass through a cell unaltered rather than expanding or decreasing exponentially at each time-step or layer, and loads can meet their ideal quality in a reasonable measure of time. This allows LSTMs to take care of the evaporating slope issue – as the value put away in the memory cell is not iteratively adjusted, the inclination does not disappear when prepared with back engendering, where markets such as NSE and BSE are considered to be Indian trading entities for our analyses.

Algorithm:

Step1: Import the required libraries

Step2: Fetch Historical data of stock

Step3: Visualization of data

Step4: Selecting required columns from dataset

Step5: Pre-processing the dataset

Step6: Defining LSTM Layers and dropouts

Step7: compile and train the model

Step8: testing the model on new data

Step9: testing against new dataset

Step10: visualize the predicted stock prices. with original prices.

Structure of LSTM model is shown below.

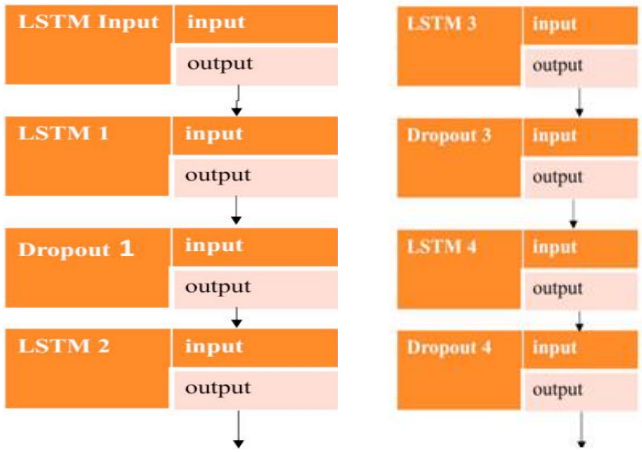
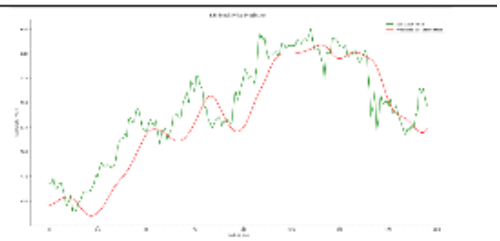
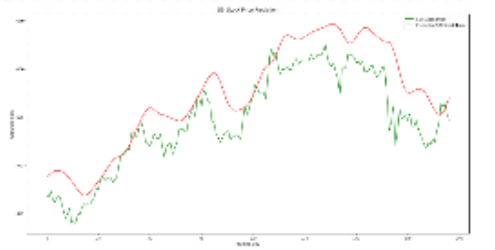
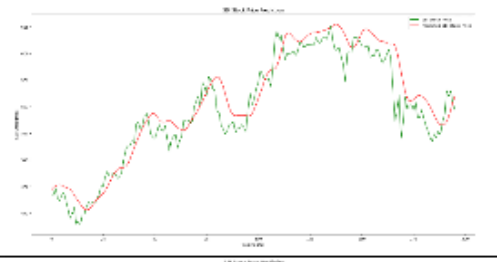
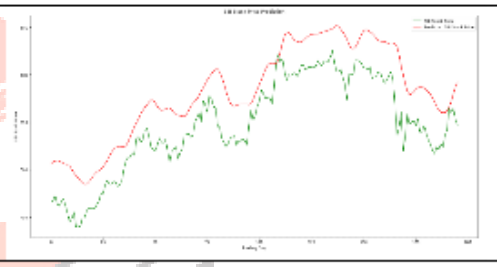


Fig. Structure of LSTM Model

V. RESULT AND DISS:

After training our neural network the obtained result is different for different epochs, batch_size, raw data etc. After comparing the loss function and processing time and predicted price obtained as input, we observe that training with less data and a greater number of epochs improves the model. This results in better forecasting of stock prices. Below table shows the processing time, loss and graph of predicted values vs original values for different epochs for SBIN (State Bank of India share).

SBIN

Epoch	Processing Time (sec)	Loss	Predicted values Vs Original values
12	72	0.0062	
25	140	0.0030	
50	321	0.0027	
100	675	0.0023	

VI. ADVANTAGES

1. Eliminates investment bias: Using the stock trading framework can eliminate bias as it ensures you make decisions analytically and not based on intuition.

2. Builds Comprehensive Analysis Habit:

Comprehensive analysis means both fundamental and technical analysis of stocks, as these two forecasting techniques together are the recipe for more accurate forecasts. One-time accurate stock market forecasts or ready-made confidence that allows traders to make a habit of extensive analysis every time only happens when you know how to predict the stock market with just a few strategies and tools.

3. Allows the smart way of making money: The smart way of making means making more and more profit using your trading skills, that can only happen when you know how to predict the stock market using several strategies and tools, allowing yourself to make money on a regular basis.

VII. CONCLUSION

In this report, we compare machine learning models such as the LSTM model, the CNN model, and a hybrid approach of the LSTM + CNN model. We tend to train the model on data from companies listed on the NSE to predict the future value of a stock. This shows that the proposed method can distinguish connections with data. The results also show that the hybrid approach of the LSTM+CNN model can identify trend changes. For the intended procedure, the LSTM + CNN hybrid approach is known to be the best model. Use

the information provided at a given point in time to make predictions. While the other two models, LSTM and CNN, are used in many other time-critical data analytics, in this case they are no better than the hybrid approach of LSTM + CNN architecture. This is often because the stock market changes rapidly. Stock market movements are not always smooth or follow a continuous cycle. Depending on the company and industry, the existence of trends and their duration vary. Analyzing these types of cycles and trends can offer traders more profits. In future work we will add more stock data and compare more models to improve the accuracy of the forecast stock prices. In the future, models can be trained with more diverse and detailed data for higher accuracy. Besides the proposed ones, other algorithms can also be used to create a new hybrid model.

VIII. FUTURE SCOPE

•We want to extend this application for predicting cryptocurrency trends.

With the increasing popularity of cryptocurrencies, enthusiasts are looking forward to a new framework for cryptocurrency prices. Cryptocurrencies being more volatile are hard to predict, so normal statistical models fail to predict these trends. LSTM and RNN models come in handy in such situations.

• We want to add sentiment analysis for better analysis.

Since our model is based on technical analysis, it can be developed to have sentiment analysis as well. This will increase the overall efficiency of the model and better profits for users.

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