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Stock Market Prediction Analysis using Deep Learning

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Abstract: *The abstract provides an overview of a proposed approach for stock market value prediction using deep learning techniques, specifically focusing on artificial neural networks (ANN) and long-short-term memory (LSTM) algorithms. The stock market is a dynamic environment influenced by various factors, such as economic conditions and market sentiment, making accurate prediction challenging yet crucial for investors.In this study, the objective is to leverage deep learning methodologies to enhance the accuracy and robustness of stock market predictions compared to traditional methods. By harnessingthe Python programming language, the research aims to develop a model capable of analyzing historical stock data and generating forecasts of future stock prices*

Keywords: Long short term memory, Artificial neural network.

I. INTRODUCTION

A share market is a place of high interest to the investors as it presents them with an opportunity to benefit financially by investing their resources on shares and derivatives of various companies. It is a chaos system; meaning the behavioral traits of share prices are unpredictable and uncertain. To make some sort of sense of this chaotic behavior, researchers were forced to find atechnique which can estimate the effect of this uncertainty to the flow of share prices. From the analyses of various statistical models, Artificial Neural Networks are analogous to nonparametric, nonlinear, regression models. So, Artificial Neural Networks (ANN) certainly has the potential to distinguish unknown and hidden patterns in data which can be very effective for share market prediction. If successful, this can be beneficial for investors and financer The significance of this research lies in addressing the limitations of conventional prediction methods that often rely on stock-related news and fail to produce reliable outcomes. The proposed approach aims to provide a more efficient and accurate prediction tool, potentially reducing the risk associated with financial decisions based on inaccurate forecasts. Key components of the study include: Utilizing deep learning techniques such as ANN and LSTM for stock market analysis. Employing Python for implementation, leveraging its flexibility and powerful libraries for data processing and model development. Evaluating the performance of the developed model against traditional prediction methods to demonstrate its superiority in terms of accuracy and efficiency. The findings of this research could have significant implications for investors and financial analysts, providing them with a more reliable tool for making informed decisions in the dynamic and complex landscape of the stock market.

II. LITERATURE- SURVEY

Price Trend Prediction of Stock Market Using Outlier Data Mining Algorithm Lei Zhao; Lin Wang IEEE 2022. In our research, a novel outlier mining algorithm is proposed to detect anomalies on the basis of volume sequence of high frequency tick-by tick data of stock market.Such anomaly trades always inference with the stock price in the stock market.By using the cluster information of such anomalies, our approach predict the stock trend effectively in the really world market.Experiment results show that our proposed approach makes profits on the Chinesestock market, especially in a long-term usage.

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Survey of stock market prediction using Deep learning approach
Ashish Sharma; Dinesh Bhuriya; Upendra Singh IEEE 2022.Prediction plays a very important role in stock market business which isvery complicated and challenging process.Employing traditional methods like fundamental and technical analysismay not ensure the reliability of the prediction.To make predictions regression analysis is used mostly. In this paper we survey of well- known efficient regression approach to predict the stockmarket price from stock market data based.In future the results of multiple regression approach could be improved using more number of variables.
Stock Market Behaviour Prediction using Stacked LSTM Networks* Samuel Olusegun Ojo; Pius Adewale Owolawi; MarediMphahlele; Juliana Adeola Adisa IEEE 2022.In this paper, we propose a stock market prediction
method based oninterrelated time series data.Though there are a lot of stock
market prediction models, there are fewmodels which predict a stock by considering other time series data.Moreover it is difficult to discover which data is interrelated with a predicted stock.Therefore we focus on extracting interrelationships between the predictedstock and various time series data, such as other stocks, world stock market indices, foreign exchanges and oil prices.

III. METHODOLOGY SECTION

Actually, traders buy the shares for less price and sales the same shares at high rate. Now stock market value prediction is one of the key research areas in current economic condition. Stock value analysis is divided into two categories. The first type is called fundamental analysis. In this analysis perform by using various parameters like political climate, current condition of the organization and economic level. Value, function, and the second is the tanh function. The sigmoid function decides which values to let through (0 or 1). The tanh function gives the weightage to the values passed, deciding their level of importance from -1 to 1.The third step is to decide what will be the final output. First, you need to run a sigmoid layer which determines what parts of the cell state make it to the output. Then, you must put the cell state through the tanh function to push the values between -1 and 1 and multiply it by the output of the sigmoid gate.With this basic understanding of LSTM, you Methodology
Our methodology consists of five steps. First, we split our raw data in study periods, composed of training sets (for in-sample training) and trading sets (for out-of-sample predictions). Second, we discuss the feature space and targets necessary for training and making predictions. Third, we provide an in-depth discussion of LSTM networks. Fourth, we briefly describe random forests, the deep net, and the logistic regression model we apply. Fifth, we develop the trading approach.

IV. PREDICTION METHOD ANALYSIS

Trading shares and commodities were primarily based on intuitions. As the trading grew, people tried to find methods and tools which can accurately predict the share prices increasing their gains and minimizing their risk. Many methods like fundamental analysis, technical analysis, and machine learning method have all been used to attempt predictions of share prices but none of these methods have been proven as a consistently applicable prediction tool.

Fundamental Analysis

Fundamental analysis is the physical study of a company in terms of its product sales, manpower, quality, infrastructure etc. to understand it standing in the market and thereby its profitability as an investment [7]. The fundamental analysts believe that the market is defined 90 percent by logical and 10 percent by physiological factors. But, this analysis is not suitable for our study because the data it uses to determine the intrinsic value of an asset does not change on daily

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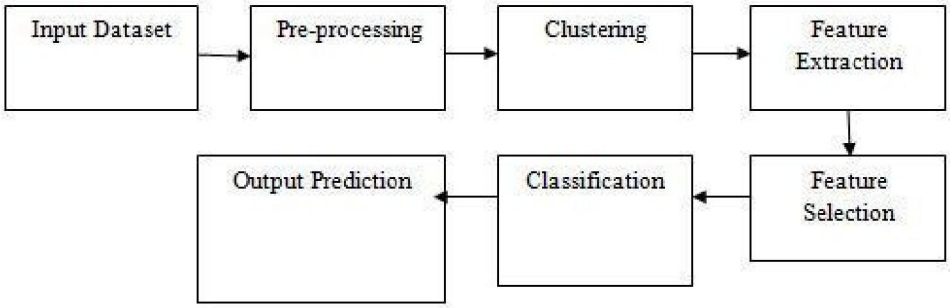
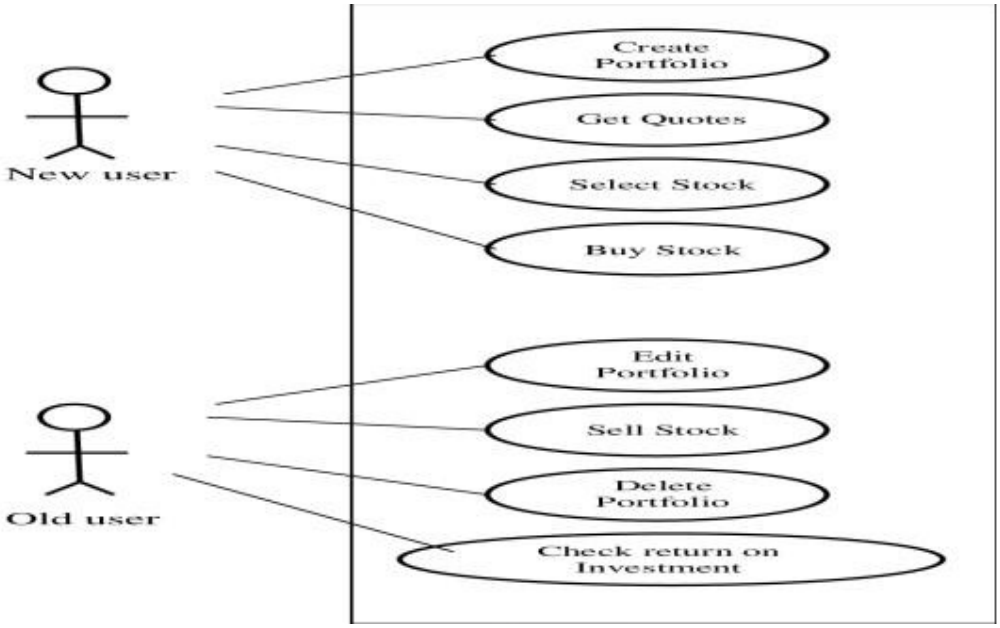
System architecture



UML Diagram

Use case Diagram



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V. DATA SET

This section details the data that was extracted from the public data sources, and the final dataset that was prepared. Stock market-related data are diverse, so we first compared the related works from the survey of financial research works in stock market data analysis to specify the data collection directions. After collecting the data, we defined a data structure of the dataset. Given below, we describe the dataset in detail, including the data structure, and data tables in each category of data with the segment definitions.

Description of our dataset

In this section, we will describe the dataset in detail. This dataset consists of 3558 stocks from the Chinese stock market. Besides the daily price data, daily fundamental data of each stock ID, we also collected the suspending and resuming history, top 10 shareholders, etc. We list two reasons that we choose 2 years as the time span of this dataset: (1) most of the investors perform stock market price trend analysis using the data within the latest 2 years, (2) using more recent data would benefit the analysis result. We collected data through the open-sourced API, namely Tushare [43], mean-while we also leveraged a web-scraping technique to collect data from Sina Finance web pages, SWS Research website.

Data structure

We collected four categories of data in this dataset: (1) basic data, (2) trading data, (3) finance data, and (4) other reference data. All the data tables can be linked to each other by a common field called “Stock ID” It is a unique stock identifier registered in the Chinese Stock market. Table 1 shows an overview of the dataset.

VI. EXPERIMENTAL RESULTS

```
In [29]: dataset_test = pd.read_csv('tatatest.csv')
         real_stock_price = dataset_test.iloc[:, 1:2].values

         dataset_test
```

Out[29]:

	Date	Open	High	Low	Last	Close	Total Trade Quantity	Turnover (Lacs)
0	12/29/2017	308.05	318.00	306.35	316.05	316.40	6874520	21586.26
1	12/28/2017	306.50	309.30	303.55	306.80	306.60	4620000	14164.22
2	12/27/2017	305.50	308.80	302.50	305.65	305.55	3315278	10164.51
3	12/26/2017	303.70	307.70	300.55	305.50	305.95	3956481	12073.55
4	12/22/2017	301.00	306.35	299.70	302.80	302.75	4703911	14271.47
...	...	...	...	...	...	...	...	...
243	1/6/2017	125.40	126.95	124.05	124.50	124.65	1255021	1573.67
244	1/5/2017	124.75	125.65	124.55	125.30	125.20	503565	630.23
245	1/4/2017	125.00	126.05	123.80	124.10	124.45	656213	818.98
246	1/3/2017	122.80	125.40	122.80	124.75	124.45	580430	721.93
247	1/2/2017	122.80	124.20	121.35	123.55	123.55	1102178	1354.06

248 rows × 8 columns

```
In [30]: dataset_total = pd.concat((dataset_train['Open'], dataset_test['Open']), axis = 0)
         inputs = dataset_total[len(dataset_total) - len(dataset_test) - 60:].values
         inputs = inputs.reshape(-1,1)
         inputs = sc.transform(inputs)
```

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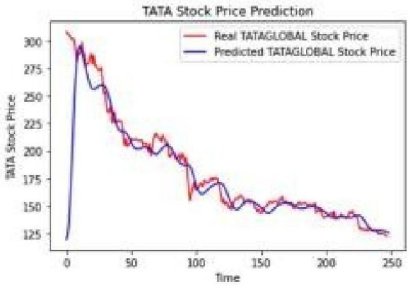
```
In [31]: X_test = []
         for i in range(60, 309):
             X_test.append(inputs[i-60:i, 0])
         X_test = np.array(X_test)
         X_test = np.reshape(X_test, (X_test.shape[0], X_test.shape[1], 1))
```

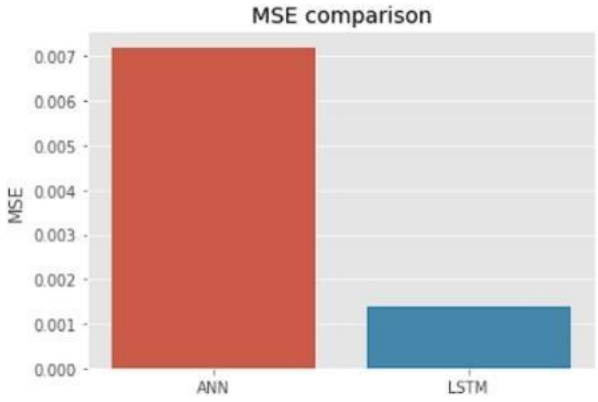
```
In [32]: predicted_stock_price = regressor.predict(X_test)
         predicted_stock_price = sc.inverse_transform(predicted_stock_price)
```

```
In [33]: plt.plot(real_stock_price, color = 'red', label = 'Real TATAGLOBAL Stock Price')
         plt.plot(predicted_stock_price, color = 'blue', label = 'Predicted TATAGLOBAL Stock Price')
         plt.title('TATA Stock Price Prediction')
         plt.xlabel('Time')
         plt.ylabel('TATA Stock Price')
         plt.legend()
         plt.show()
```



Out[34]:

	Agorithms	MSE
0	ANN	0.0072
1	LSTM	0.0014



VII. CONCLUSION

Stock market values are not stable as it is changed day by day. Due to this reason the prediction of future stock value is a tedious process. In olden days stock market values are predicted by using various tock related news. But it does not provide the better result. If there is any error on the predicted value it leads to the huge loss. All traders are interested to buy the shares at the less amount and sales the shares in higher rate. For that reason proper prediction methods are needed. In current situation various Deep learning concepts are used to predict the stock market value. In this LSTM Deep learning concept is used to predict the stock market value. For this prediction historical values are

used. This proposed LSTM concept generates better result compared with other eep leaning concepts. The future work of this project is to add more attributes in this share market value prediction.

Future Scope And Enhancemnet

Further research is required to analyze the comprehensive legal landscape that aim to predict stocks of all companies from all sectors. In the project, we proposed the use of the data collected from different global financial markets with Deep learning algorithms in order to predict the stock index movements. In future we can do to deep learning method of classification of stock market. Numerical results suggest the high efficiency. The practical trading models built upon our well-trained predictor. The model generates higher profit compared to the selected benchmarks.

Scope of the project

LSTM is the new learning algorithm to control the decision. In this project we presented a hypothetical and experiential architecture to implement LSTM concept to predict the stock market value. Initially four organization economic factors are considered for multivariate approach.

Next, LSTM concept was used to analyze the association among the factors and predict the stock market value.The main scopes of the project are as follows:To find out the accuracy in predicting stock market.

- To find out detail study of each company stocks.
- Our work should be applicable to all datasets

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