ISSN 2395-1621

Stock market prediction with the assistance of Deep Learning algorithms

Mahesh Jawalkar, Piyush Khankar, Omkar Sutar, Smruti Chavan, Kamal Reddy

maheshjawalkar9@gmail.com
pkhankar008@gmail.com
osutar665@gmail.com
chsmruti@gmail.com
kamalreddy94@gmail.com

Department of Computer Engineering ,
Siddhant college of Engineering, Savitribai Phule Pune University, Pune, India.

ABSTRACT

Stock market prediction is the attempt to determine the future value of the company's stock price on an exchange. The successful prediction of a stock's future value might yield a major profit. For prediction specifically, we will be using Deep Learning and Neural Network algorithms. This system presents the design and implementation of a unique technique to predict stock exchange trends. The model is built on historical stock exchange data set obtained from the Indian National Stock Exchange (www.nseindia.com) over a 20-year period. The model uses a Support vector machine (SVM), Long-Short Term Memory (LSTM) and Multi-layer Perceptron classifier (MLP) to learn and predict the future stock exchange trend for a basket of various companies. Finally, the predicted stock price within a duration will be converted into a graphical format.

Keywords: Stock Market, Stock Market Prediction, Deep Learning, Time Series, Regression Analysis, SVM, LSTM, MLP.

ARTICLE INFO

Article History

Received: 27th July 2020

Received in revised form : 27th July 2020

Accepted: 29th July 2020

Published online : 4th August 2020

I. INTRODUCTION

A stock (also known as "shares" or "equity") is a type of security that signifies proportionate ownership in the issuing corporation. This entitles the stockholder to that proportion of the corporation's assets and earnings. The successful prediction of a stock's future price could yield significant profit. We will work with historical data about the stock prices of a publicly listed company. We will implement a mix of machine learning algorithms to predict the future stock price of this company, starting with simple algorithms like multiple linear regression. Time Series forecasting & modelling plays an important role in data analysis. Time series analysis is a specialized branch of statistics used extensively in fields such as Econometrics & Operation Research. Time Series is being widely used in analytics & data science.

This is specifically designed time series problem for you and challenge is to forecast traffic. Broadly, stock market analysis is divided into three parts – Fundamental Analysis, Technical Analysis and Sentimental Analysis

[1] Fundamental Analysis involves analysing the company's future profitability on the basis of its current business environment and financial performance.

[2] Technical Analysis, on the other hand, includes reading the charts and using statistical figures to identify the trends in the stock market.

[3] Sentimental Analysis, also called "investor sentiment" is not always based on fundamentals. The process of computationally identifying and categorizing opinions expressed in a piece of text, especially in order to determine whether the writer's attitude towards a particular topic, product, etc. is positive, negative, or neutral.

The successful prediction of a stock's future price could yield significant profit. For prediction particularly we will use Machine Learning, Deep Learning and Neural Network algorithms. When tested with real stock prices over a week, it was found that the model was able to achieve extremely high accuracy in predicting the stock trends. Proposed model is based on the study of stocks historical data and technical indicators. In this paper we focus on technical analysis using a Deep learning technique known as Support

Vector Machines (SVM), Long-Short Term Memory (LSTM) and Multi-layer Perceptron classifier (MLP).

II. LITERATURE SURVEY

[1] NSE Stock Market Prediction Using Deep-Learning Models (2013) The neural network, one of the intelligent data mining technique that has been used by researchers in various areas for the past 10 years. Prediction and analysis of stock market data have got an important role in today's economy. The various algorithms used for forecasting can be categorized into linear (AR, MA, ARIMA, ARMA) and non-linear models (ARCH, GARCH, Neural Network).In this paper, we are using four types of deep learning architectures i.e Multilayer Perceptron (MLP), Recurrent Neural Networks (RNN), Long Short-Term Memory (LSTM) and Convolutional Neural Network (CNN) for predicting the stock price of a company based on the historical prices available. Here we are using day-wise closing price of two different stock markets, National Stock Exchange (NSE) of India and New York Stock Exchange (NYSE). The network was trained with the stock price of a single company from NSE and predicted for five different companies from both NSE and NYSE. It has been observed that CNN is outperforming the other models. The network was able to predict for NYSE even though it was trained with NSE data. This was possible because both the stock markets share some common inner dynamics. The results obtained were compared with ARIMA model and it has been observed that the neural networks are outperforming the existing linear model (ARIMA).

[2] A Machine Learning Model for Stock Market Prediction (2014) Stock market prediction is the act of trying to determine the future value of a company stock or other financial instrument traded on a financial exchange. The successful prediction of a stock's future price will maximize investor's gains. This paper proposes a machine learning model to predict stock market price. The proposed algorithm integrates Particle swarm optimization (PSO) and least square support vector machine (LS-SVM). The PSO algorithm is employed to optimize LS-SVM to predict the daily stock prices. Proposed model is based on the study of stocks historical data and technical indicators. PSO algorithm selects best free parameters combination for LS-SVM to avoid over-fitting and local minima problems and improve prediction accuracy. The proposed model was applied and evaluated using thirteen benchmark financials datasets and compared with artificial neural network with Levenberg-Marquardt (LM) algorithm. The obtained results showed that the proposed model has better prediction accuracy and the potential of PSO algorithm in optimizing LS-SVM.

[3] Predicting Market Performance with Hybrid Model In this research, a stock market prediction model was proposed to predict performance of Karachi Stock Exchange (KSE), now merged into Pakistan Stock Exchange (PSX). The model was comprised of four sub-models that were all based on different machine learning technique. Each sub model used 6 input attributes including fuel price, commodity, foreign exchange, interest rate, general public sentiment and related NEWS. The historical data of the market was also used for predicting the market performance Average (ARIMA) and Simple Moving Average (SMA). Support Vector Machine, Radial Basis Function (RBF), Artificial Neural Network's two variants including Single Layer Perceptron and Multi-layer Perceptron were used to design four different sub-models. The results predicted by all the sub-models were merged in the Hybrid Model.using statistical techniques like Auto-Regressive Integrated Moving

[4] Sentiment-Aware Stock Market Prediction: A Deep Learning Method International Stock market prediction has attracted much attention from academia as well as business. However, it is a challenging research topic, in which many advanced computational methods have been proposed, but not yet attained a desirable and reliable performance. This study proposes a new method for stock market prediction, which adopts the Long Short-Term Memory (LSTM) neural network and incorporates investor sentiment and market factors to improve forecasting performance. By extracting investor sentiment from forum posts using Naïve Bayes, this paper makes it possible to analyse the irrational component of stock price. Our empirical study on CSI300 index proves that our prediction method provides better prediction performance

III. PROPOSED SYSTEM

The proposed work is developed as an application which will predict the stock prices for next thirty days. Using Deep Learning algorithms, the prediction will be performed. The input of system will be labelled data set in the format of csv file, and the output of system will be in the graphical format such as Graphs and Charts.

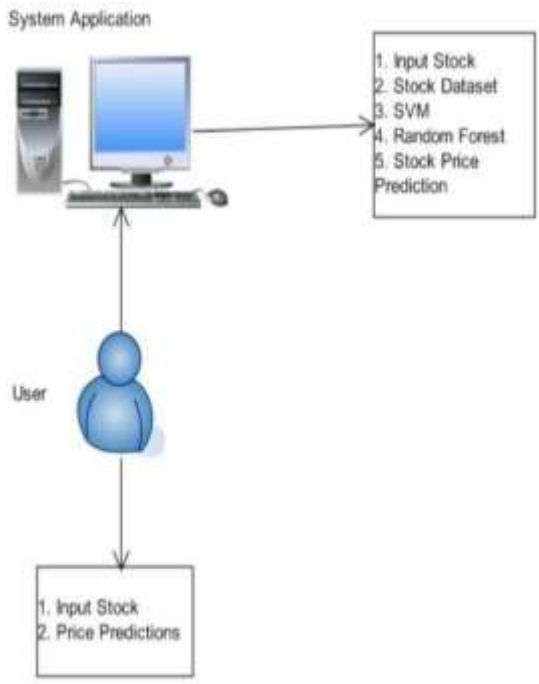

Fig.1:- System Architecture

METHODOLOGY:

Regression Analysis: Regression analysis is used in stats to find trends in data. For example, you might guess that there's a connection between how much you eat and how

much you weigh; regression analysis can help you quantify that. Regression analysis will provide you with an equation for a graph so that you can make predictions about your data. For example, if you've been putting on weight over the last few years, it can predict how much you'll weigh in ten years' time if you continue to put on weight at the same rate. It will also give you a slew of statistics (including a p-value and a correlation coefficient) to tell you how accurate your model is. Most elementary stats courses cover very basic techniques, like making scatter plots and performing linear regression. However, you may come across more advanced techniques like multiple regression.

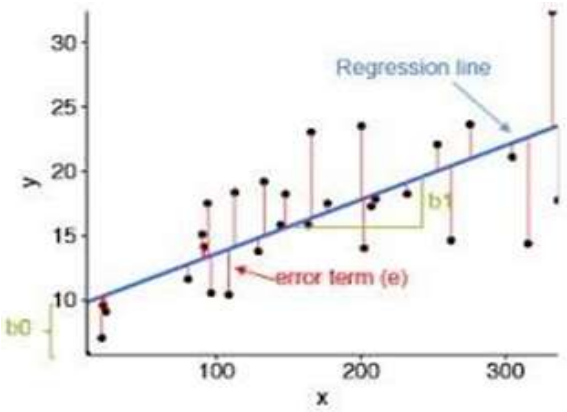

Fig 2: Regression Analysis

[2] Time Series Analysis: A time series is a series of data points indexed (or listed or graphed) in time order. Most commonly, a time series is a sequence taken at successive equally spaced points in time. Thus it is a sequence of discrete-time data. Examples of time series are heights of ocean tides, counts of sunspots, and the daily closing value of the Dow Jones Industrial Average. Time series are very frequently plotted via line charts. Time series are used in statistics, signal processing, pattern recognition, econometrics, mathematical finance, weather forecasting, earthquake prediction, electroencephalography, control engineering, astronomy, communications engineering, and largely in any domain of applied science and engineering which involves temporal measurements. Time series analysis comprises methods for analysing time series data in order to extract meaningful statistics and other characteristics of the data. Time series forecasting is the use of a model to predict future values based on previously observed values.

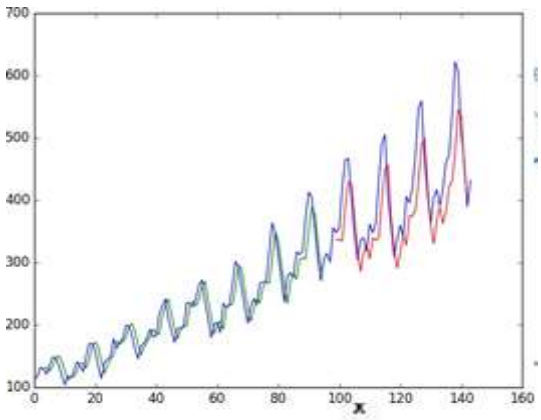

Fig 3: Time Series Analysis

[3] Support Vector Machine: is a machine learning technique used in recent studies to forecast stock prices. Our goal is to use SVM at time t to predict whether a given stock's price is higher or lower on day t +m. We look at the technology sector and 34 technology stocks in particular. We input four parameters to the model - the recent price volatility and momentum of the individual stock and of the technology sector. These parameters are calculated using daily closing prices for each stock from the years 2007 through 2014. We analyse whether this historical data can help us predict price direction. If the Efficient Markets Hypothesis (EMH) holds true, prices should follow a random walk and be unpredictable based on historical data. We find that in the short-term this holds true, but in the long-term we are able to reach prediction accuracies between 55% and 60%. We conclude that our model is able to achieve significant prediction accuracies with some parameters in the long-term, but that we must look at more granular intra-day trading data to achieve prediction accuracies in the short-term.

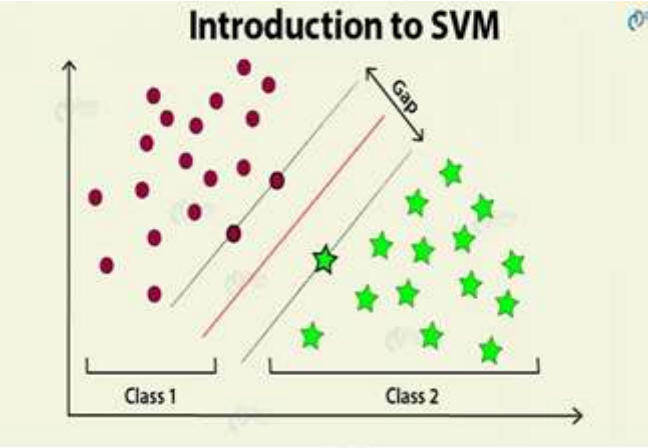

Fig 4: Support Vector Machine

[4] Long short-term memory (LSTM): is an artificial recurrent neural network (RNN) architecture, used in the field of deep learning. RNNs have the ability of storing certain information about the data for later use and this extends the network's capability in analysing the complex structure of the relationships between stock price data. A problem with RNNs is the vanishing gradient problem. This is due to the fact that when the number of layers increases, the learning rate (value less that one) is multiplied several times, and that causes the gradient to keep decreasing. This is combated by LSTMs, making them more effective. LSTM networks are well-suited to classifying, processing and making predictions based on time series data.

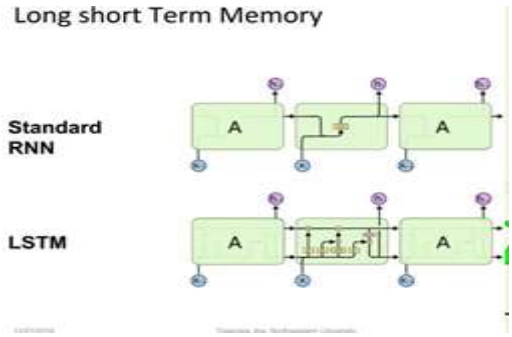

Fig 5: LSTM

IV. RESULT AND DISSCUSSION

In the proposed system, the data is pre-processed. Then the pre-processed dataset is trained for prediction. The stock market future prices are predicted use deep learning algorithms- Support Vector Machine (SVM), Long-Short Term Memory (LSTM) and Multi-layer Perceptron classifier (MLP). The accuracy of the system is increased in order to get the accurate prediction of the increase and decrease in the value of stocks. The successful and accurate prediction of a stock value can yield significant profit.

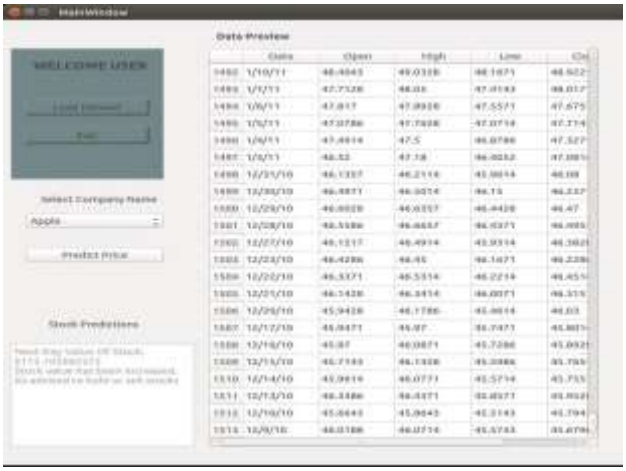

Fig 6: Data Processing

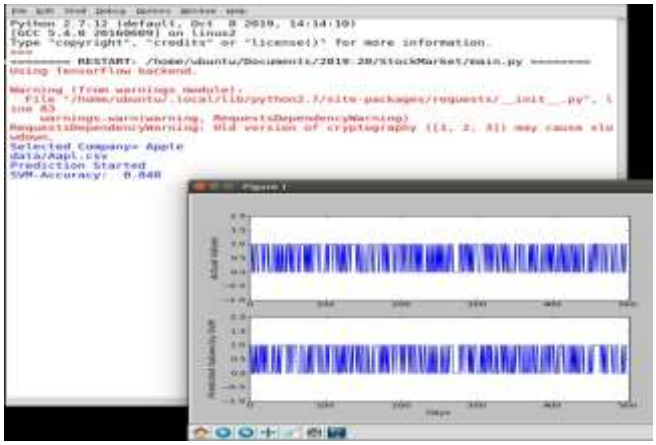

Fig 7: Prediction by SVM

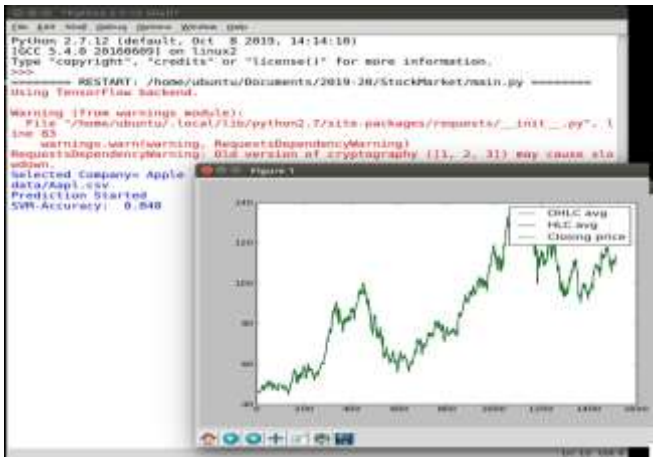

Fig 8: Graphical Representation

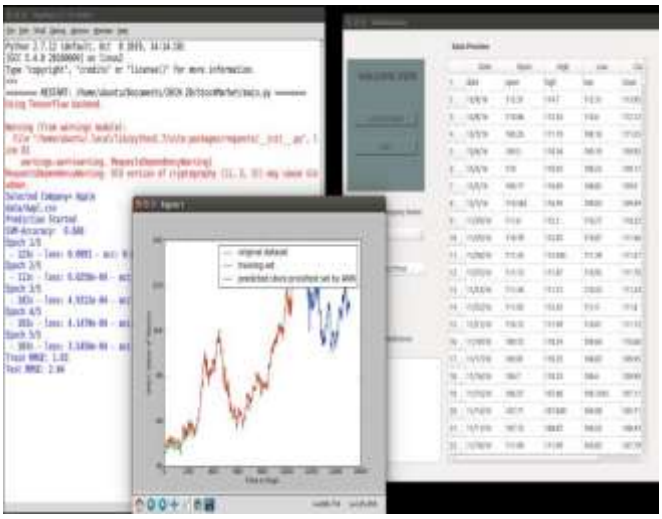

Fig 9: Comparision of actual and predicted values

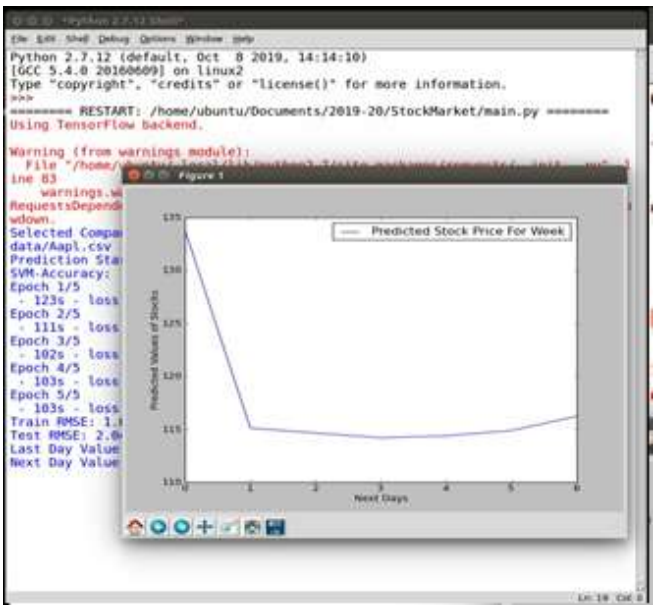

Fig 10: Prediction of Stock Prices for a week

Comparative results of existing and proposed system is as follow,

Parameters	Existing System	Proposed System
Pre-processing data	YES	YES
Training Huge Dataset	NO	YES
Deep Learning Algorithm	NO	YES
Graphical representation	YES	YES
Accuracy	YES (Low)	YES (High)

V. ACKNOWLEDGEMENT

It gives us great pleasure in presenting the preliminary project report on 'Stock Market Prediction Using Deep

Learning Algorithms. We would like to take this opportunity to thank our internal guide Prof. Kamal Reddy for giving us all the help and guidance which we needed. We are really grateful to them for their kind support. Their valuable suggestions were very helpful. At last we must express our sincere heartfelt gratitude to our Parents who helped us directly or indirectly during this project work.

VI. CONCLUSION

Thus, using the proposed model, it's possible to train the model using existing stock dataset. This system aims to use the data to predict and forecast the stock price for thirty days in future. In this paper we focus on technical analysis using a Deep learning technique known as Support Vector Machines (SVM), Long- Short Term Memory (LSTM) and Multi-layer Perceptron classifier (MLP). The successful and accurate prediction of a stock value can yield significant profit.

REFERENCE

[1] Umadevi.K.S, Abhijitsingh Gaonka, Ritwik Kulkarni- "Analysis of Stock Market using Streaming data Framework"

[2] Tanapon Tantisripreecha, Nuanwan Soonthornphisaj- "Stock Market Movement Prediction using LDA-Online Learning Model"

[3] Manoj S Hegde, Ganesh Krishna, Dr. Ramamoorthy Srinath- "An Ensemble Stock Predictor and Recommender System"

[4] Badre LABIAD, Abdelaziz Berrado, Loubna Benabbou- "Intelligent System for Intraday Stock Market Forecasting"

[5] Zhihao PENG-" Stocks Analysis and Prediction Using Big Data Analytics"

[6] Haoxuan Qiu, Fanzhuoqun Liu- "Candlestick Analysis in Forecasting U.S. Stock Market: Are They Informative and Effective"

[7] Md. Mujibur Rahman Majumder, Md. Imran Hossain, Mohammad Kamrul Hasan- "Indices prediction of Bangladeshi stock by using time series forecasting and performance analysis"

[8] Dev Shah, Haruna Isah, Farhana Zulkernine- "Predicting the Effects of News Sentiments on the Stock Market".

[9] Hiransha Ma, Gopalakrishnan E.Ab , Vijay Krishna Menonab, Soman K.P- "NSE Stock Market Prediction Using Deep-Learning Models"

