

An Empirical Study on Application of Stock Price Prediction using Deep Learning Algorithm

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Abstract— Stock price prediction is full of research problem in machine learning. It depends on a large number of factors which contribute to changes in the supply and demand of stock share prediction and analysis of the stock market dataset which plays a significant role in today's economy. The cycle in the financial exchange is conspicuous with part of flightiness so it is a lot of influenced by parcel numerous elements. This turned into a significant undertaking in business and money. There are assortment of calculations that are utilized for foreseeing/gauging. They are by and large classified into two sorts. One is direct model and the other one is non-straight model. Auto Regression [AR], Auto Regression moving Average [ARMA], Auto Regression Integrated Moving Average [ARIMA] are arranged as straight models. Neural Networks are non-straight models. Fake Neural Networks and profound learning are the most overall instruments utilizing python program. Such methods square measure accommodating in learning progressed kinds of data by exploitation models of directed learning exploitation essential libraries. In profound learning, from any place a program is composed, it'll be getting customized to be advised gradually the strategy to perform insightful errands of execution on the far side the programming limits it step by step acquires through stock datasets and expertise. in view of high volumes of data getting produced accessible business sectors, machines would master separating designs, in that approach making genuinely reasonable forecasts. various Deep learning models/designs square measure effectively available for stock worth expectation of a particular organization.

- Recurrent Neural Networks(RNN)
- Convolutional Neural Networks(CNN)
- Artificial Neural Networks

LSTM model is made out of a successive information layer followed by three lstm layers and a thick layer with enactment and afterward at long last a thick yield layer with the direct actuation work. In this research project KERAS with LSTM models has been explored. Historical stock price data was obtained from yahoo finance and used to build LSTM model using python codes to visualize real and predicted price and using regression equation function to forecast stock price and calculating mean absolute error, mean squared error and mean absolute percentage error to find accuracy.

Keywords: Deep Learning (DL), LSTM (Long Short Term Memory) Model, Recurrent Neural Networks (RNN), High frequency algorithmic trading, stock price prediction, time series analysis, linear regression

I. INTRODUCTION

Data analysis have been used in all business for data-driven decision making. In share market, there are many factors that drive the share price, and the pattern of the change of price is not regular. This is why it is tough to take a robust decision on future price. Artificial Neural Network (ANN) has the

capability to learn from the past data and make the decision over future. Deep learning networks such as Convolutional Neural Network (CNN), Recurrent Neural Network (RNN) etc. works great with multivariate time series data. We train our model from the past stock data and calculate the future price of that stock. This future price use to calculate the future growth of a company. The stock market is a vast array of investors and traders who buy and sell stock, pushing the price up or down. The prices of stocks are governed by the principles of demand and supply, and the ultimate goal of buying shares is to make money by buying stocks in companies whose perceived value (i.e., share price) is expected to rise. Stock markets are closely linked with the world of economics —the rise and fall of share prices can be traced back to some Key Performance Indicators (KPI's). The five most commonly used KPI's are the opening stock price ('Open'), end-of-day price ('Close'), intraday low price ('Low'), intra-day peak price ('High'), and total volume of stocks traded during the day ('Volume').

II. LITERATURE REVIEW

There are lots of research work in stock market prediction as well as in LSTM. Almost every data mining and prediction techniques were applied for prediction of stock prices. Many different features and attributes were used for the same purpose. There are three main categories of stock market analysis and prediction such as (a) Fundamental analysis, (b) Technical analysis and (c) Time series analysis. Most of the stock forecasting techniques with time series data normally use either a linear such as AR, MA, ARIMA, ARMA, CARIMA, etc. [1],[2] or non-linear models (ARCH, GARCH, ANN, RNN, LSTM, etc.). Authors in [3] have analyzed many different macro-economic factors by designing a data warehouse that affects share price movement such as crude oil price, exchange rate, gold price, bank interest rate, political stability, etc.

The Investigation of Stock Market Prediction Using Machine Learning Approach has been mentioned. The stock exchange forecast has become a sharp area of interest. Particular assessment is one of them, yet it does not reliably deliver specific results, so it is essential to develop strategies for progressively accurate gauge. All the procedures recorded under the backslide have their own ideal conditions and obstacles over their various accomplices. The way in which straight backslide models act is that they are consistently fitted using the least squares approach, however they may be fitted in different habits, for example by reducing the "non-appearance of fit" in some other standard, or by diminishing a disabled variation of the least squares setback work. Again, the least squares approach can be used to fit nonlinear models.

As suggested by [4] The Long Short Term Memory (LSTM) networks are a type of recurrent neural network (RNN) capable of addressing linear problems. LSTM is a deep learning technique. Long-term Memory (LSTM) Units are enforced to learn very long sequences. This is a more

general version of the gated recurrent system. LSTM is more benign than other deep learning methods like RNN or traditional feed forward because LSTMs tackle the evanescent gradient issue possessed by [5].

RautSushrut et al.[6] suggested that supervised learning classifier be used to forecast stock price movement based on financial index data, and determine their ability. In the financial market computational analytical approaches have been portfolio modeling. A discussion about the statistical AI methodology has been addressed; the usage of SVM methodology has been shown in the paper and also shown that tactical methodologies can be applied to predict the stock prices.

Manoj S Hegde et al.[7] investigated that The Long Short Term Memory (LSTM) networks are a type of recurrent neural network (RNN) capable of solving in volute linear problems, and also there is a discussion about the usage of RNN (Recurrent Neural Networks) to predict the share prices.

M. Roondiwala et al.[8] proposed that the Long ShortTerm Memory is the most popular RNN architecture. In the secret network layer, LSTM introduces a memory cell; a processing device that replaces conventional artificial neurons, using these memory cells, networks can effectively link memory and remote input in time, making it suitable to dynamically capture data structure over time with a high predictive limit. It is also shown in the paper that the stock prediction can be done on the NIFTY50 shares. The data collection is one of the major step and later the training of our model and there is a need to test the algorithm by applying different data set to the algorithm. Our procedure will be discussed in coming sections.

As Kim and H. Y. Kim et al.[9] identified that .another significant issue with basic ANNs for stock forecast is the marvel of detonating fleeting inclination, where the loads of a gigantically huge system either become excessively massively enormous or too inuscul (respectively),drastically easing back their union to the ideal worth. This is regularly brought about by two components: loads are instated self-assertively and the loads progressively proximate to the end of the system moreover slope to transmute significantly more than those at the beginning. It is also mentioned in the paper that the usage of LSTM networks can be applied in procedure of predicting share prices.

As discussed by S. Selvin et al.[10], Customary types for dealing with the financial exchange investigation and the stock-value forecast include a major review of the past stock-exhibition gander and the general credibility of the organization itself, and a measurable investigation that is solely concerned with the calculation and recognition of stock-value designs, it also mentioned in the paper that different types of analysis that can be performed in order to predict the stock value.

Loke.K.S et al.[11] suggested that the volatile nature of the stock market is an area that needs a lot of analysis based on historical data. Traditional stock trend forecast algorithms use historical time series stock data, traditional technical forecasting procedures for stock prices are based on statistical data analysis. in the paper author also talks about the change and advancements in the process of predicting stock prices using AI and Machine Learning methodologies, there are

many research which are being conducted to find a accurate model to predict the stock prices and there is no universal solution which is available to apply, hence the historic data of a share will be considered for stock price prediction.

Xi Zhang1 et al. [12] suggested that the stock markets play critical roles in modern society's economic operations. It is also metioned in the paper that the analysis can be performed an the data that is retrieved from a legitimate source and proposed a methodology in which we can utilize multiple source of information to predict the stock values.

Tao Xing and Yuan Sun et al. [13] suggested a model which considers the historical equity share price of a company price and applies RNN (Recurrent) technique called Long Short Term Memory (LSTM). The proposed approach considers available historical data of a share and it applies prediction on a particular feature. The features of shares are Opening price, day High, day Low, previous day o price, Close price, Date of trading. The proposed model uses the time series analysis in order to predict a share price for a required time span.

Jordan Prosky et al. [14] suggested that, the CNN methodologies and its usage in predicting stock prices, a method to apply sentiment analysis on stock prediction.

As mentioned by X. Shao and D. Ma [15] it is a more general version of the gated recurrent system. LSTM is more benign than other deep learning methods like RNN or traditional feed forward neural networks because LSTMs tackle the evanescent gradient issue possessed by RNNs and it is also mentioned that how to implement LSTM along with K-means algorithms for a short term stock predictor systems.

III. METHODOLOGY AND EXPERIMENTATION

A. Long-Short Term Memory

Long Short-Term Memory (LSTM) is one of various sorts of Recurrent Neural Network RNN, it's furthermore ready to do getting data from past stages and use it for future assumptions [7]. As a rule, an Artificial Neural Network (ANN) comprises of three layers:

- 1) input layer,
- 2) Hidden layers,
- 3) yield layer.

In a NN that essentially contains one camouflaged layer the measure of focuses in the information layer dependably rely on the assessment of the information, the focuses of the information layer interface with the shrouded layer by techniques for affiliations called 'neurotransmitters'. The connection between every two local area centers from (commitment to the covered layer), has a coefficient called weight, which is the manager for signals. The path toward learning is traditionally a benefits with change of loads, in the wake of completing the course toward learning, the Artificial NN will have ideal loads for each neural affiliations. The covered layer place centers apply a sigmoid or meandering overstated (tanh) work on the extent of loads coming from the data layer which is known as the incitation work, this change will make respects, with a kept botch rate between the train and test data using the SoftMax work. The credits obtained after this change incorporate the yield layer of our NN, these value may not be the best yield, for the current circumstance

a back increase cycle will be applied to zero in on the ideal examination of goof, the back causing measure interface the yield layer to the concealed layer, offering a hint changing the best weight with the ideal bungle for the proportion of ages picked. This cycle will be kept attempting to improve our assumptions furthermore, limit the supposition goof. Following to completing this cycle, the model will be readied. The classes of NN that envision future worth base on passed development of perceptions is called Recurrent Neural Network (RNN) such a NN use earlier stages to learn of data and gauge possibilities plans. The past occasions of data should be attempted to envision and figure future characteristics, for the current condition the covered layer act like a stock for the past information from the reformist data. The term monotonous is used to portray the case of using segments of earlier plans to figure future data. RNN can't store long time memory, so the usage of the Long Short-Term Memory (LSTM) considering "memory line" wind up being useful in guaging cases with long time data. In a LSTM the support of prior stages can be performed box doors with along memory line joined. The ashown figure portray the arrangement of LSTM.

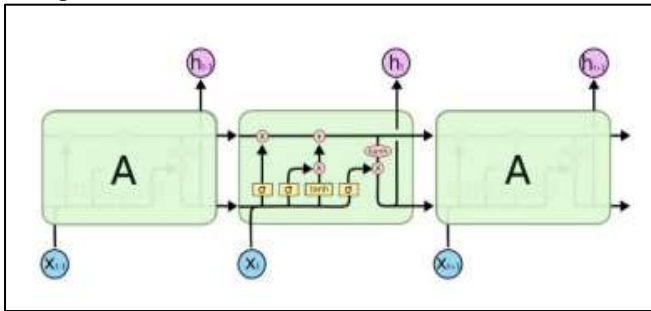


Fig. 1: architecture of LSTM model[16]

The constraint of reviewing plan of information makes the LSTM an exceptional sort of RNNs. Each LSTM center point most be including a huge load of cells aware of managing passed data streams, the upper line in each phone interfaces the models as transport line giving over data from the past to the current ones, the independency of cells helps the model with designing channel of add assessments of a telephone to another. In the end the sigmoidal neural association layer framing the sections drive the cell to an ideal motivation by setting everything straight or permitting data to experience. Each sigmoid layer has a twofold worth (0 or 1) with 0 "let nothing experience"; and 1 "let everything experience." The objective here is to control the condition of every cell, the entryways are controlled as follow:

- Forget Gate yields a number some spot in the extent of 0 and 1, where 1 layout "totally keep this"; nonetheless, 0 shows "altogether disregard this."
- Memory Gate works in a way to deal with information inside the cell. Beginning, a sigmoid layer "input section layer" picks which respects will be changed. By then, a tanh layer makes a vector of new competitor respects that could be added to the state.
- Output Gate picks what will be the yield of every cell. The yield worth will be set up on the cell state close by the separated and freshest added information.

B. Proposed System

Getting the historical data from market is mandatory step. Then there is a need to extract the feature which is required for data analysis, then divide it as testing and training data, training the algorithm to predict the price and the final step it to visualize the data. The typical LSTM unit consists of a cell, an info door, an entrance door and a door with a view. The cell gathers esteems throughout optional time stretches, and the three sources of info deal with the advancement of information into and out of the cell. The main advantage of the LSTM is its ability to learn context-specific temporal dependence. Each LSTM unit gathers data for either a long or brief timeframe (thus the name) without expressly utilizing the actuation work inside the repetitive parts. A huge assurance to note is that any cell state is particularly expanded by the yield of the ignored entrance, which changes some place in the scope 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.

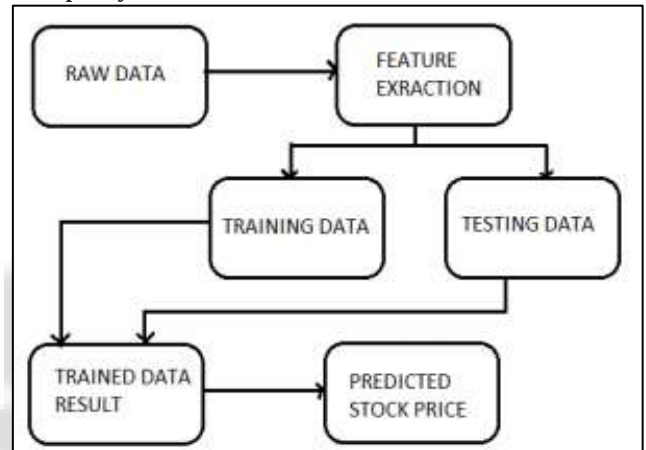


Fig. 2: System Architecture

C. Scope of the Study

In this analysis the performed numerical analysis on the stocks dataset is to do predicting the long run value of the stock. Mathematical investigation will be performed by regarding the stock pattern as a measurement or time arrangement and that endeavor to gauge future expenses by discerning the expenses over last sixty assortment of days. I used tensor flow, keras, pandas, numpy, sklearn, matplotlib libraries used as tool in executing important forecasting python code for stock data analysis using jupyter notebook. To get best future anticipated qualities it has been utilized KERAS bundle with LSTM for trainset 80% and test set 20%. After forecasting actual and predicted graph. I calculated forecasted price using regression function and percentage deviation in price using MAD, MSE and MAPE.

D. Operational definitions

If error is less than 1 then gradient get vanished in last cell, if gradient is greater than 1 then when it is reach last cell it get explode, means gradient will reach very high value.

To overcome this problem it come with long short term memory network. These are extraordinary sort of intermittent neural organization, equipped for learning long haul conditions. In this each cell is updated with controlling input which controls previous memory which handle

exploding and vanishing gradient as it controls how much input it want from previous cell.

With the help of tensorflow and high level libraries it has become easy to build network.

E. Sampling Design

LSTMs are incredibly astonishing in course of forecasting gauge issues since they're set up to store past data. This is pivotal for our condition considering the way that the past cost of a stock is needed in anticipating its future cost. Process start of by bringing in NumPy for logical calculation, Matplotlib for plotting charts, and Pandas to assistant in stacking and controlling our datasets.

F. Loading Dataset

to load the train data this code is widely used in python
`df_train = pdr.DataReader('BHARTIARTL', data_source='yahoo', start='2020-01-01', end='2020-12-31')`
`df_train`

to making execution of programmed code easily understandable by machine we use binary code. In this circumstances, Scikit-Learn's MinMaxScaler has been used to scale stock price information in the range of zero and one.

Feature Scaling

from sklearn.preprocessing minmaxscaler tool has been taken
`sc = MinMaxScaler(feature_range = (0, 1))`
`training_set_scaled = sc.fit_transform(training_set)`

The sigmoid layer yields numbers some place in the scope of 0 and 1, portraying the measure of each part should be let through. An estimation of 0 methods "not allow anything," while an estimation of 1 signifies "allow everything!" An LSTM has three of these doors, to secure and control the cell state.

G. Creating Data with Time steps

LSTMs fabricate stock value information to be in a special organization, generally a 3D cluster. It begins by making information in 60 timesteps and changing over it into an exhibit utilizing NumPy. Then, we convert the information into a 3D measurement exhibit with `X_train` tests, 60 timestamps, and one component at each progression.

H. Building the LSTM

To build the LSTM layer in order, few modules from keras has been imported

- 1) Sequential layer for introducing the neural organization
- 2) Dense layer for adding a thickly associated neural organization layer
- 3) LSTM for adding the Long Short-Term Memory layer
- 4) Dropout for adding dropout layers that forestall overfitting

To avoid overfit lstm unit in sequence with some dropout layer get added. LSTM layer with the following arguments get added:

- 1) `50 units` which is the realm of the output space
- 2) `return_sequences=True` which determines whether to return the last output in the output sequence, or the full sequence
- 3) `input_shape` as the shape of our training set.
- 4) When characterizing the Dropout layers, we indicate 0.2, implying that 20% of the sequence of stock data

will be dropped. Adding the Dense layer that determines the yield of 1 unit. After this, incorporating our model utilizing the famous adam enhancer and set the misfortune as the `mean_squared_error`. This will figure the mean of the squared blunders. Then, we fit the model to run on 100 epoch with a group size of 32.

I. Predicting Future Stock using the Test Set

Getting the real stock price of jan 2021
`df_test = pdr.DataReader('BHARTIARTL', data_source='yahoo', start='2021-01-01', end='2021-01-31')`
To foresee future stock data it is need to do a few things subsequently to stacking in the test set:

- 1) Merge the preparation set and the test set on the 0 pivot.
- 2) Set the time venture as 60 (as seen beforehand)
- 3) Use MinMaxScaler to change the new dataset
- 4) Reshape the dataset as done beforehand

Subsequent to making the forecasts we use `inverse_transform` to get back the stock costs in ordinary coherent arrangement.

J. Data Collection Methods

Dataset is taken using the historical stock price of a particular company using python code from yahoo finance named Bharti airtel and Hindustan unilever of different sectors from NIFTY50 Index. The data set contains data like past closing price, opening, high, low, volume of the stocks of that company. From these datasets, we tend to tend to extract alone a pair of months of share price data; this information area unit planning to be accustomed train the model. using this trained set of data, predicting the 61th day stock market value of that company are accomplished.

Independent variable: previous closing price, opening, high, low, volume

Dependent variable: predicted closing price

K. Methodology adopted for the analysis

Research has been done using a particular and previous day closing prices, open, high, low price of ten nifty50 company in National stock exchange extracted from yahoo finance, example for BHARTI AIRTEL our data series cover the period going from 1/1/2020 to 31/01/2021. To construct our model we will utilize the LSTM RNN, our model uses 80% of information for preparing and the other 20% of information for testing. For preparing we utilize mean squared blunder to enhance our model. Likewise, we utilized distinctive Epochs for preparing information (100 epochs and 200 epochs)

L. Limitations of the study

The purpose of my research was to compare actual and predicted price graph through visualization and forecast stock price using regression function. As because of effect of Coronavirus pandemic on economy the research has been done using stock price of before pandemic period. I have forecasted graph of price with 100 and 200 'epoch', which is a passes in time in AI demonstrates the quantity of share price data goes through the whole preparing dataset the AI calculation has finished. With not so much information but rather more ages can improve our testing results and

simultaneously permit us to have better estimating and forecast esteems.

IV. RESULTS AND CONCLUSION

A. Nifty50 Companies Jan 2021 Stock Trend Analysis

Python code used for 30 day mean with 200 epoch
`df_train['Close: 30 Day Mean'] = df_train['Close'].rolling(window=30).mean()
df_train[['Close', 'Close: 30 Day Mean']].plot(figsize=(16,6))`

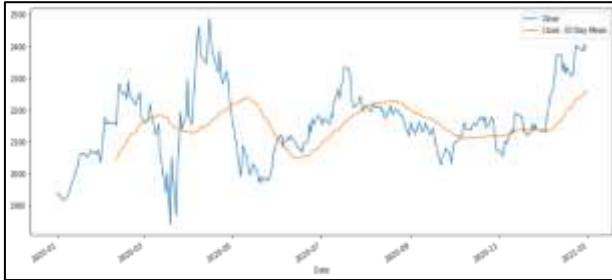


Fig. 4: 30 day moving average over closing price of Hindustan Unilever

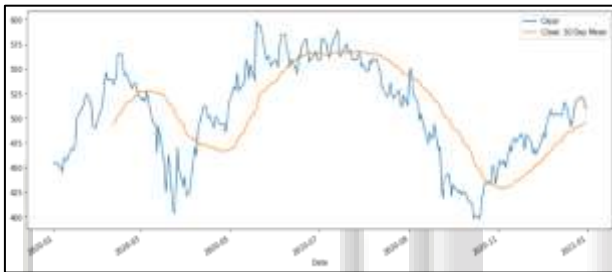


Fig. 5: 30 day moving average over closing price of Bharti Airtel

A lot of intraday traders rely on short term moving averages to take buy and sell decisions. In the price crossover strategies, traders look to buy or go long or buy at the point when the cost is over the moving normal. They sell or short a stock when the cost is beneath the moving normal. A simple moving average like a 30-day MA helps smoothens out the impact of dynamic ups and downs in stock prices, also referred to as the 'noise' of price action. Moving averages are indicators of trends. An upward trend indicates a likely surge in prices, and a downward-looking slope may show price decline. The inclination of the slope can point to whether the prices have bottomed or topped out.

Moving midpoints are the most widely recognized marker in specialized investigation. The moving normal itself may likewise be the main pointer, as it fills in as the establishment of endless others, for example, the Moving Average Convergence Divergence (MACD).

B. Python Visualization of Actual and Predicted Price Graph of Jan 2021 with 200 Epoch

1) Bharti Airtel

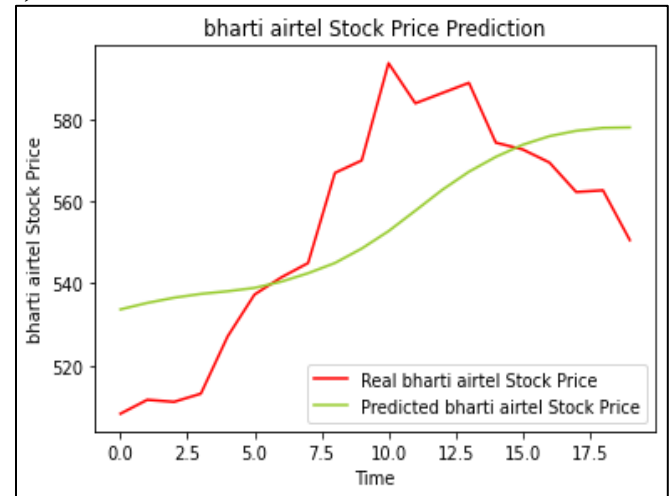


Fig. 6: bharti airtel real vs predicted price with 200 epoch
Bharti Airtel share price gained over 2% intraday on 15-02-2021 following reports that the telecom major received almost all regulatory approvals required to raise foreign direct investment (FDI) in its downstream companies.

Bharti Airtel has received approval from Reserve Bank of India (RBI) and the Foreign Investment Promotion Board (FIFB), to increase FDI up to 74% in its payments bank, Airtel Payments Bank.

Following the news, Bharti Airtel share price opened higher at Rs 542.80 and later gained 2.62% intraday to Rs 554.40 against the previous close of Rs 540.25. Bharti Airtel share is trading higher than 5, 20, 50, 100 and 200-day moving averages.

Bharti Airtel share has risen 19% in one year. The telecom company has gained 5% in the last one week, 8% in one month and 7% since the beginning of the year.

2) Hindustan Unilever

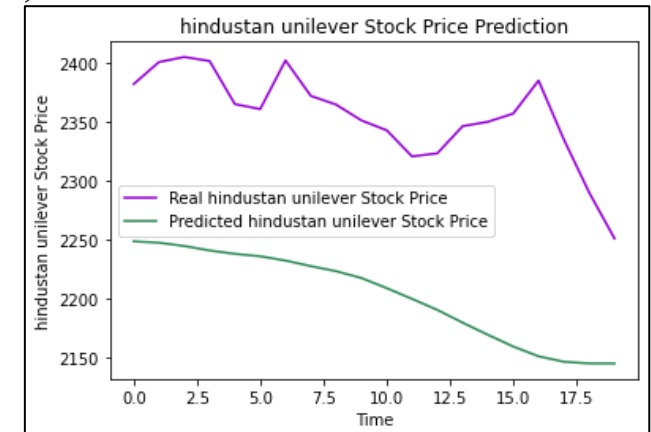


Fig. 7: Hindustan Unilever real vs predicted price with 200 epoch

The HindustanUnilever (NSI: HINDUNILVR) share price has risen by 7.92% over the past month and it's currently trading at 2279.2. For investors considering whether to buy, hold or sell the stock, the question now is whether this price run will continue.

C. Forecasting Stock Price Using Regression of Jan 2020

Regression equation with one dependent and one independent variable is defined by

$$Y = mx + c$$

Where m is regression coefficient, x is independent variable and c is a constant.

Based on the past value slope is calculated. To compare with actual price, forecasted price is calculated taking 30 days data as test data using excel.

Regression is one of the popular way to do the prediction of share prices. Using regression model it has been found out MSE which is average of difference between actual and predicted price, MAD is average distance between each data point and mean value, MAPE which is mean absolute percentage deviation of prediction accuracy of forecasting method.

1) Hindustan Unilever Forecasted Stock Price Using Regression and Measurement of Deviation from Actual Price

Date	Close	forecast	ABS error	error^2	% error
01-01-2020	1936.55	₹ 1,916.66	19.88655	395.4748	1%
02-01-2020	1938.05	₹ 1,922.77	15.27805	233.4188	1%
03-01-2020	1927.45	₹ 1,928.88	1.430549	2.04647	0%
06-01-2020	1915.45	₹ 1,947.21	31.75605	1008.447	2%
07-01-2020	1920.7	₹ 1,953.31	32.61455	1063.709	2%
08-01-2020	1929.35	₹ 1,959.42	30.07302	904.3868	2%
09-01-2020	1935.05	₹ 1,965.53	30.48145	929.1189	2%
10-01-2020	1954	₹ 1,971.64	17.64	311.1696	1%
13-01-2020	1994.85	₹ 1,989.97	4.884476	23.85811	0%
14-01-2020	2008.8	₹ 1,996.07	12.72605	161.9523	1%
15-01-2020	2021.65	₹ 2,002.18	19.46752	378.9845	1%
16-01-2020	2049.25	₹ 2,008.29	40.959	1677.64	2%
17-01-2020	2060.3	₹ 2,014.40	45.90055	2106.86	2%
20-01-2020	2062.85	₹ 2,032.73	30.1251	907.5215	1%
21-01-2020	2055.4	₹ 2,038.83	16.5664	274.4457	1%
22-01-2020	2051.7	₹ 2,044.94	6.757951	45.6699	0%
23-01-2020	2056.9	₹ 2,051.05	5.849402	34.2155	0%
24-01-2020	2073.7	₹ 2,057.16	16.54095	273.6031	1%
27-01-2020	2061.35	₹ 2,075.48	14.1344	199.7813	1%
28-01-2020	2060.6	₹ 2,081.59	20.9929	440.7019	1%
29-01-2020	2074.2	₹ 2,087.70	13.50155	182.2918	1%
30-01-2020	2058.1	₹ 2,093.81	35.7099	1275.197	2%
			21.802	583.2043	1%
			MAD	MSE	MAPE

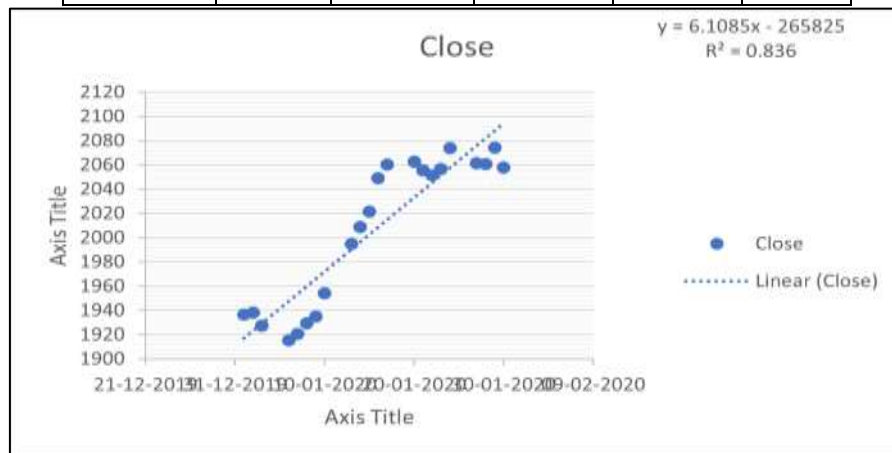


Fig. 8: Hindustan Unilever regression graph of closing price

excel has calculated slope, $m = 6.10$ which means on average the stock of Hindustan unilever increased by 6.10 during Jan 2020 after forecasting it has been found that percentage difference is between 0% to 3% which means it's a good forecast. If it were of more than 10% then it will not be an accurate.

Mean absolute error or deviation tells us how big of an error we can expect from forecast on average it is below 10 which is good for cheaper stock and since it is below 50 because of high share value it is also good.

2) Bharti airtel forecasted stock price using regression and measurement of deviation from actual price

Date	Close	forecast	ABS error
01-01-2020	453.3	₹ 446.32	6.979288
02-01-2020	455.2	₹ 448.69	6.509612
03-01-2020	455.1	₹ 451.06	4.039906
06-01-2020	449.65	₹ 458.17	8.519206
07-01-2020	445.1	₹ 460.54	15.43889
08-01-2020	458.85	₹ 462.91	4.058594
09-01-2020	460.1	₹ 465.28	5.178294
10-01-2020	457	₹ 467.65	10.648
13-01-2020	468.9	₹ 474.76	5.857106
14-01-2020	469.35	₹ 477.13	7.776794
15-01-2020	467.85	₹ 479.50	11.64649
16-01-2020	473.9	₹ 481.87	7.966206
17-01-2020	500.05	₹ 484.24	15.81409
20-01-2020	508.7	₹ 491.35	17.35501
21-01-2020	511.75	₹ 493.71	18.0353
22-01-2020	514.5	₹ 496.08	18.4156
23-01-2020	523.65	₹ 498.45	25.19592
24-01-2020	524.25	₹ 500.82	23.4262
27-01-2020	514.4	₹ 507.93	6.467124
28-01-2020	491.25	₹ 510.30	19.0526
29-01-2020	490.25	₹ 512.67	22.4223
30-01-2020	489.8	₹ 515.04	25.24201
			13.00203
			MAD

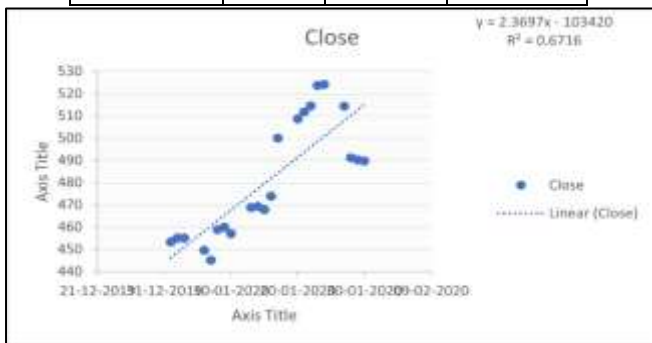


Fig. 9: Bharti Airtel regression graph of closing price

excel has calculated slope, $m = 2.36$ which means on average the stock of bharti airtel increased by 2.36 during Jan 2020 after forecasting it has been found that percentage difference is between 0% to 5% which means it's a good forecast. If it were of more than 10% then it will not be an accurate.

Mean absolute error or deviation tells us how big of an error we can expect from forecast on average it is below 20 which is good for moderate price stock.

V. CONCLUSION

The fame of financial exchange trading is growing rapidly, which is encouraging experts to find new techniques for the assumption using new systems. The guaging system isn't simply supporting the subject matter experts yet it similarly helps theorists and any individual dealing with the protections trade. To help predict the stock records, a guaging model with extraordinary precision is required. The purpose of research was to forecasting stock price trend of year 2019 for a forecast horizon of January 2020, four regression models are designed following LSTM networks using different python libraries and checking quantity of dataset with different epoch which can bring good accuracy. The KERAS with LSTM model have been executed for 10 nifty50 organizations utilizing train dataset and MSE and MAD has been determined to discover the precision. Train and test dataset has been separated in 80% and 20% so all that outcome can be assessed. Precision has been determined by the blunder between values anticipated by the model and the qualities noticed.

In the result shown in the above graph is the plotted form deep learning algorithm outcome by applying 50 LSTM units for achieving the accuracy.

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