Stock Market PredictionWeb Service Using Deep Learning by LSTM

Mohammad Mahabubul Hasan, Pritom Roy, Sabbir Sarkar and Mohammad Monirujjaman Khan
Department of Electrical & Computer Engineering
North South University Dhaka-1229, Bangladesh
shourav6688@gmail.com, pritom52@gmail.com, sabbirsarker25@gmail.com
monirujjaman.khan@northsouth.edu

2021 IEEE 11th Annual Computing and Communication Workshop and Conference (CCWC) | 978-1-6654-1490-6/21/$31.00 ©2021 IEEE | DOI: 10.1109/CCWC51732.2021.9375835

Abstract—**Predicting the future price of stocks using closing price via LSTM, an artificial recurrent neural network is presented in this paper. Here the dataset of previous stock closing prices from DSE Bangladesh has been used to train the module. Deep learning using the TensorFlow library has been used to train the system for predicting price in graphical format. The system is live as a web service using Django and android applications. Test results have given 70% accurate prediction stats. Currently, the service has a free subscription for users and will be charged in the future.**

Keywords— **LSTM, TensorFlow, Deep Learning, DSE-BD, Close Price.**

I. Introduction

In recent years we've seen in Bangladesh that the Stock market is not stable at all. In 2011 Stocks continued to tumble amid jitters over banks' liquidity crisis. After starting the day at 5,710, DSEX, the benchmark index of the Dhaka Stock Exchange, plunged to below 5,700 points in less than half an hour. Eventually, it lost 81.92 points to close the day at 5,623.64. People invest a lot in the stock market [1-2]. Many people just lost their hard-earned money in a blink of an eye because of investing in the wrong place. But we've seen the vice versa situation from the stock market as well. There are over 640 companies that are listed in DSE, having a market capitalization of around 18000M [1-3]. So, it's a huge impact on our socio-economic structure. The million-dollar question for stock financial specialists is if the cost of a stock will rise or not. The variance of the securities exchange is rough, and there are many muddled monetary markers. Just individuals with broad experience and information can comprehend the importance of the pointers, use them to make great expectations to get a fortune. Most others can just depend on karma to bring in cash from stock exchanging trading.

Deep learning is an opportunity for ordinary people to gain a steady fortune from the stock market and also can help experts to dig out the most informative indicators and make a better prediction. There are currently 47,536,971 volumes of stock in our DHAKA Stock Exchange [3-5]. Developments in the financial exchange can have a significant monetary effect on the economy and individual customers. A breakdown in offer costs can possibly cause a far-reaching financial disturbance. The point of the undertaking is to look at various changed examining procedures to foresee future stock costs dependent on past costs and mathematical news markers to build an arrangement of different stocks to enhance the danger. Previously, to predict the stock market some researchers used classical algorithms like Linear Regression, K-Nearest Neighbor, Auto Arima. And, every algorithm has its own learning pattern. But to train a time series model like these we can decide what information needs to be stored and what not. We have used a vast dataset to train, test and predict the stock price of an IPO, which gives us a reliable model to work with. We will use the predicted result in our web-service with a human centered user experience; which creates a user centric model in our web service. We will do this by applying supervised deep learning methods for stock price forecasting by interpreting the seemingly chaoticmarketdata.

II. Working Procedure

At first, the goal of our service was to make it efficient and less time-consuming and cover as many companies as we can. But the initial challenge was to create our model to train the dataset where it can predict the close price of tomorrow. So, we did research to find the best suitable model to train our data. Data collecting and cleaning was one the toughest part because the data were not served in the correct order. At first, we collected data of 2 companies from their beginning at Dhaka Stock Exchange. First testing set for the model, which is tested on Grameen Phone stock shown in figure 1.

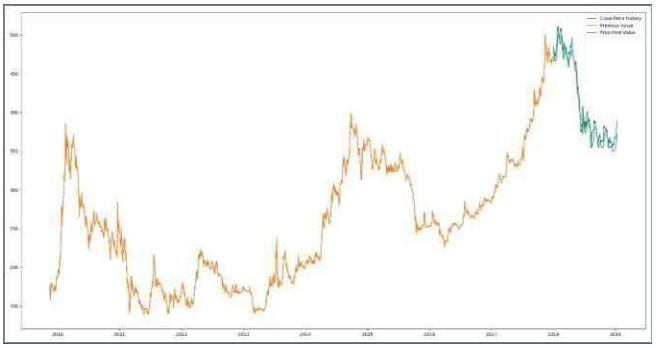

Figure 1: First testing set for the model, which is tested on Grameenphone.

LSTM is capable of learning long term dependencies. The first piece of the block takes the initial stage of the network and first time step of the sequence X(1) which in that case the dataset subsection of our training set, and that gives us the first output(h1) which is the testing set and the updated cell state (c1). At the time step t, the block takes the current state of the network (c(t-1), h(t-1) and the next time step of the sequence X(t). The LSTM architecture of our model is shown in figure 2.

978-0-7381-4394-1/21/$31.00 ©2021 IEEE

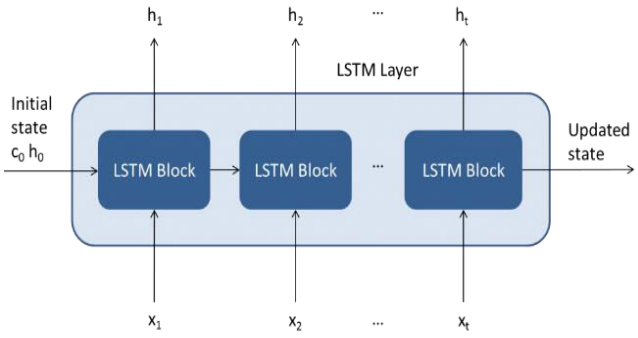

Figure 2: LSTM Architecture

A. Web-Based Architecture

The administrator can manage the whole system and database. Admin can develop the system, impose DOS, create a database, sort all users, implement new features, have the highest privileges. Admin can also manage a user's account or supervise it. Admin can also grant users for various actions and facilities. Here managing a user also includes observing payments, user interactions, providing graphs and stats. Admin can also observe guest users and interact with payment gateways, DSE data, and applications [7-9]. A registered user can access features of the site based on the subscription period. All features, payment, use of the application should be permitted by the admin. Users can also see News on IPOs, DSE daily data, News on world stocks, etc. Guest users can only see the site overview and access few free services. Figure 3 shows the use case of the system.

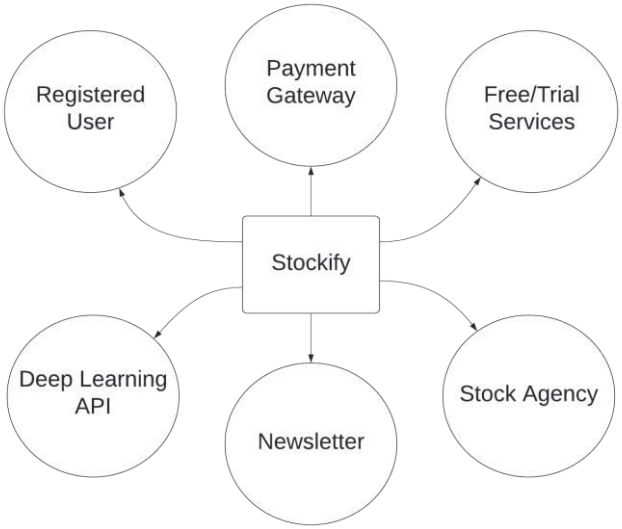

Figure 3: Use case diagram of the system

First, the Market Prediction System models and predicts the progression of cash between the business sectors. It isolates the anticipated data from any random noise. It, at that point, makes a model that extends the future direction of the given market in the multidimensional space of

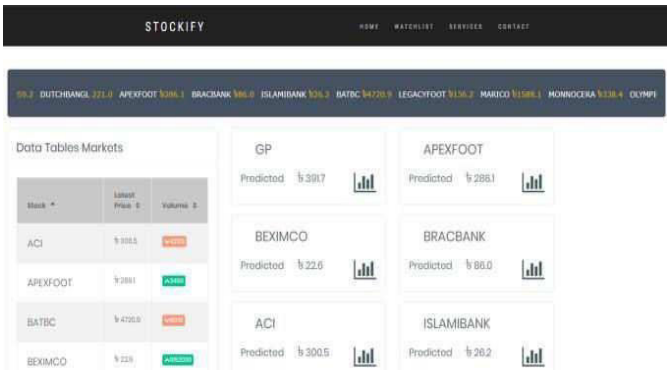

Figure 4: Web-based view of our system

We've added the company-based views to our users so that they can easily find out what's going on through their invested companies and keep track ofthem.

III. Comparative Analysis

Various stock forecast predictors are there, which works based on trained algorithms to show trendy stocks and future prices. One of them is UNIVERSAL MARKET PREDICTOR INDEX(UMPI) [11-14]. Their algorithm can track stock market trends that would be humanly impossible to notice, ensuring that one is better informed as he/she analyses the stock market. But their stock market predictions are not fool-proof but are reliable with greater accuracy than any other system on the market. Marketing timing isalsoseen there. The forecasting data is on previous data in our web service shown at figure 5.

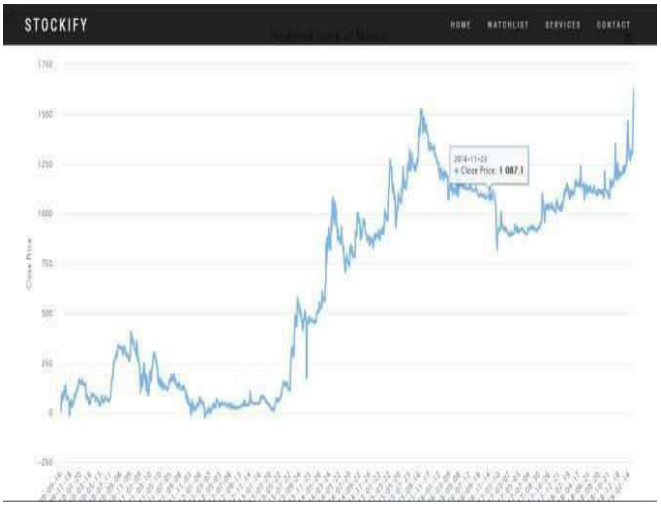

Figure 5: Forecasting based on previous data inweb

different business sectors. The framework yields the anticipated pattern as a number, positive or negative, alongside the wave diagram that predicts how the waves will cover the pattern. This assists the merchant with choosing which course of exchanging.

when to enter the exchange, and whento exit. The following diagram shows forecasting analysis flowchart. The flow chart for our stock forecasting service is shown at figure 6.

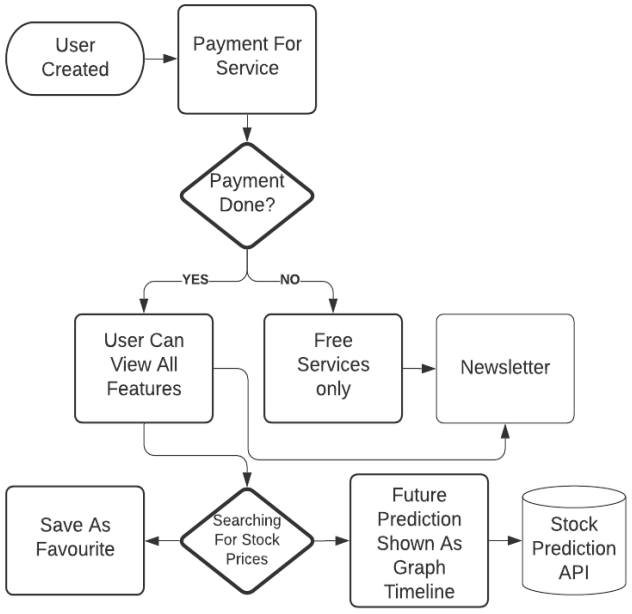

Figure 6: Flow chart for forecasting analysis

In the above flow chart, we're presenting the flow of our web service where we can see the segment of services between a guest user and a registered user. The paid user can or a registered user can set his favorite stock, can view prediction of the stock he wants to follow. On the other hand, the guest user can use the platform to view a limited number of predicted stock price and for the newsletter.

Such kinds of web services don't prevail to this day in Bangladesh. We intend to create such web service which would be based on algorithm, training data and deep learning. This would help users to gamble in a less risky way.
Forecasting of Grameen Phone's stock is shown at figure 7.

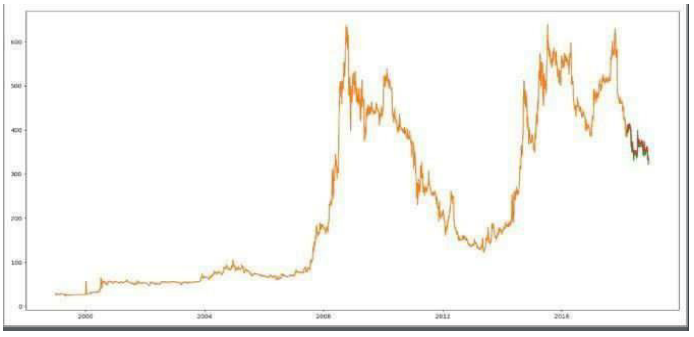

Figure 7: Forecasting Grameen Phone's Stock

The above graph is for Grameenphone (GP), where the horizontal axis is for the timeline, and the vertical axis is for the share price. The timeline is from December 2009 to the end of 2018. In the case of Grameenphone, LSTM (Long Short-Term Memory) was successful in capturing the pattern because it uses the current window information forthe prediction.

The universally useful of this paper is to plan a model to anticipate all the while the initial cost, and the end price of a stock on the following day as per the past price of the stock and other specialized boundary information.
There is a boundary of step size in the contribution of the LSTM neural organization that implies the number of chronicled information to recollect as a kind of perspective for foreseeing the current cost. To utilize a generally decent advance size in the investigation of the multi-esteem related model, a correlation test is performed with 6112 example information, at the progression size of 5, 10, 20 and 30, and with the emphasis number of 50. Forecasting of ACI's stock is shown at figure 8.

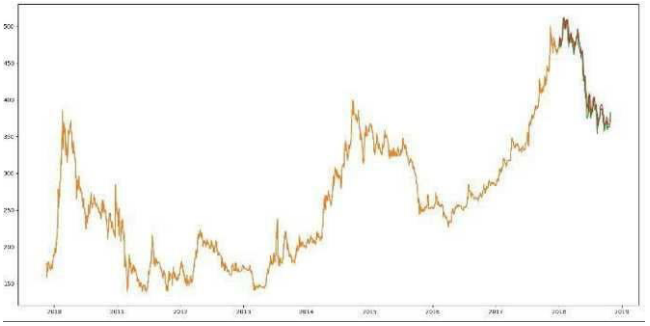

Figure 8: Forecasting ACI's Stock

The above graph is for ACI, where the horizontal axis is for the timeline, and the vertical axis is for the share price. The timeline is from 1999 to 2018.

IV. CONCLUSION

The result of this study confirms that machine learning techniques are capable of predicting the stock market performance. Dhaka Stock Exchange does follow the behavior that can be predicted by machine learning techniques. It demonstrated how machine learning outperforms statistical and regression techniques in forecasting share prices. In future, we are hoping to add different parameters to our model for better prediction result and add new features to our web service to make this system much robust and sustainable.

V. ACKNOWLEDGMENT

The creators of this paper might want to thank the Dhaka Stock Exchange and Amar Stock for the documentation and the information which are precious for this project. North South University deserves also a credit also.The author would also like to thank the supervisor for continuous support and guidance.

VI. REFERENCES

[1] Forecasting market movement using tensorflow, alpaca,2008 [Online] Available at: https://hackernoon.com/forecasting- market-movements-using-tensorflow- fb73e614cd06?fbclid=iwar1vh0g-78kcwooebdwml59wtvvrom07kqe5dzb1p1h

axwptfdfvir6ji6a[Accessed: 06- Oct-2019].
[2] Company listing of Dhaka stock exchange [Online] Available at: https://www.dsebd.org/company%20listing.php[Accessed: 06- Oct-2019].
[3] Markettrendanalysis[Online] Available at: https://www.amarstock.com/trendanalysis[Accessed: 06- Oct-2019].
[4] DSEmonitorfulllist[Online] Available at: http://dsemonitor.com/quote1stprimfmf.html[Accessed: 06- Oct-2019].
[5] DSE suffer sharpest fall from April by daily star (2017) [Online] Available at: https://www.thedailystar.net/business/dse-suffers-sharpest-fall-april-1474075[Accessed: 09- Oct-2019].
[6] Tk 3528CR wiped off from DSE in a week by daily star (2017)[Online] Available at: https://www.thedailystar.net/business/news/tk-3528cr-wiped-dse-week-1648546[Accessed: 09- Oct-2019].
[7] Dhaka stock exchange 30 technical analysis [Online] Available at: https://www.investing.com/indices/dhaka-stock-exchange-30-technical[Accessed: 09- Oct-2019].
[8] Present state of Bangladesh stock market and it's problems and prospects by PranabChandra Ghosh (2017) [Offline][Accessed: 12- Oct-2019].
[9] Amar stock trendanalysis [Online] Available at: https://stockbangladesh.com[Accessed: 12- Oct-2019].
[10] Data collection from stock Bangladesh[Online] Available at: https://stockbangladesh.com [Accessed: 12- Oct-2019].
[11] Stock market forecasting research based on neural networkand patternmatching [Online] Available at: https://ieeexplore.ieee.org/document/5592759?fbclid=iwar1yverjddwzgki5upmtmiih20nrnlkzagtu5czmpkf11lo8997j2ao-33q [Accessed: 12- Oct-2019].
[12] André Denis Olivera "forecasting stock markets using machine learning", research paperonpsi-20[Online] Available at: https://run.unl.pt/bitstream/10362/21452/1/tegi0383.pdf[Accessed: 12- Oct-2019].
[13] Asimple deep learning model for stock price prediction using tensorflow by SebastianHeinz (2018) [Online] Available at: https://medium.com/mlreview/a-simple-deep- learning-model-for-stock-price-prediction-using-tensorflow-30505541d877[Accessed: 12- Oct-2019].
[14] Just another ai trying to predict the stock market: part1by sime onkostadinov(2018) [Online] Available at: https://towardsdatascience.com/just-another-ai-trying-to-predict-the-stock-market-part-1-d0663673a30e[Accessed: 12- Oct-2019].
[15] Bangladesh stockmarket [Online] Available at: https://www.slideshare.net/pranabghosh1/bangladesh-stock-market-analysis-pc-ghosh[Accessed: 12- Oct-2019].