Dr. Vishwanath Karad
MIT WORLD PEACE UNIVERSITY | PUNE
TECHNOLOGY, RESEARCH, SOCIAL INNOVATION & PARTNERSHIPS

Minor Project-I Report

ON

Nifty Closing Price Prediction

SUBMITTED BY,

SHREERANG MHATRE (52)

SARVESH GURAV (44)

Project Guide:

Prof. MANISHA WANI

Year: 2023-2024

School of Electrical and Computer Engineering

Dr. Vishwanath Karad, MIT world Peace University Pune - 38.

CERTIFICATE

This is to certify that the Minor Project - I entitled

Nifty Closing Price Prediction

has been carried out successfully by

SHREERANG MHATRE (52)

SARVESH GURAV (44)

during the Academic Year **2023-2024** in partial fulfillment of their course of study for
Bachelor's Degree in
Electrical and Computer Engineering as per the syllabus prescribed by the **MIT-WPU**

Internal Guide

Head,
(School of Electrical Engineering)

DECLARATION

We the undersigned, declare that the work carried under

Minor Project - I entitled

Nifty Closing Price Prediction

has been carried out by us and it has been not implemented by any external agency/company that sells projects. We further declare that work submitted in the form of a report has not been copied from any paper/thesis/website as it is. However existing methods/approaches from any paper/thesis/website have been cited and have been acknowledged in the reference section of this report.

We are aware that our failure to adhere to the above, the Institute/University/Examiners can take strict action against us. In such a case, whatever action is taken, it would be binding on us.

PRN	**Name of student**	**Signature with date**
1032211745	SHREERANG MHATRE	
1032222100	SARVESH GURAV	

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ABSTRACT

The stock market is viewed as an unpredictable, volatile, and competitive market. The prediction of stock prices has been a challenging task for many years. Designing and developing a prediction model with an accurate stock price prediction has been an active field of research in the stock market for a long time. On the other hand, predicting stock price movement is the most critical aspect of the entire forecast process. There exist propositions in the literature that have demonstrated that if properly designed and optimized, predictive models can very accurately and reliably predict future values of stock prices. In this paper we offer an overview of the use of deep learning networks for the Nifty index, its analysis and prediction. We have used the dataset that goes to long back Nifty 50 Index of the National Stock Exchange (NSE) of India from 17 September 2007 to the latest 20 October 2023 for training and testing the Forecasting Models. Our proposition includes models namely Gated Recurrent Unit (GRU), Long-and-Short-Term Memory (LSTM), Bidirectional GRU, Bidirectional LSTM, XGBoost, Random Forest, a total of 6 forecasting and prediction deep learning models for parallel forecasting and returning accurate results. We present detailed results on the forecasting accuracies for all our proposed models. The results show that while all the models are very accurate in forecasting the NIFTY Closing values.

Chapter 1 INTRODUCTION

1.1 Overview

In this research endeavor, we delve into the intricate landscape of the stock market, acknowledged for its inherent unpredictability, volatility, and competitiveness. The formidable challenge of accurately predicting stock prices has long been a focal point of research, prompting the development of intricate predictive models. Within this context, our study focuses on the Nifty 50 Index of the National Stock Exchange (NSE) of India, spanning from September 17, 2007, to October 20, 2023. Employing a comprehensive dataset, we propose and evaluate six distinct forecasting models, including Gated Recurrent Unit (GRU), Long-and-Short-Term Memory (LSTM), Bidirectional GRU, Bidirectional LSTM, XGBoost, and Random Forest. Our meticulous analysis reveals compelling results, showcasing the remarkable accuracy of all models in forecasting the NIFTY closing values, thereby contributing valuable insights to the dynamic realm of stock market prediction.

1.2 Scope

This research goes beyond predicting stock prices for the Nifty 50 Index of the NSE, India. By examining various forecasting models, including deep learning and traditional machine learning, our study contributes to a broader understanding of predictive analytics in financial markets. Our findings have implications for risk management, investment strategies, and financial decision-making. The methodologies and insights can extend to other stock indices and financial instruments, enhancing the applicability of the proposed forecasting models. This research benefits investors, financial analysts, academics, and professionals involved in developing predictive models in the dynamic global financial landscape.

Chapter 2 Review of Literature

2.1 Literature

1) Fathali, Zahra, Zahra Kodia, and Lamjed Ben Said. "Stock market prediction of Nifty 50 index applying machine learning techniques." Applied Artificial Intelligence 36.1 (2022): 2111134.

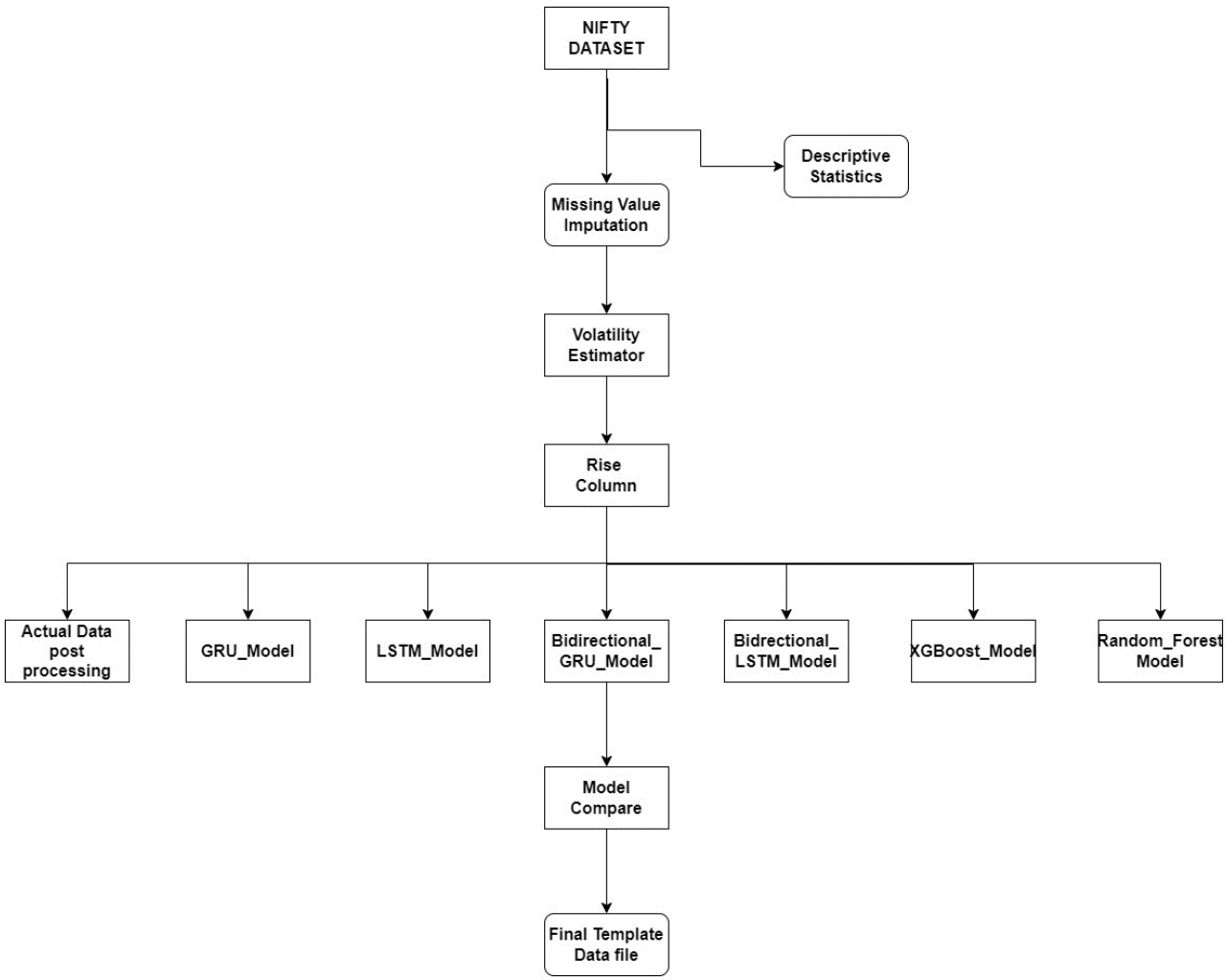
2) P. S. Sisodia, A. Gupta, Y. Kumar and G. K. Ameta, "Stock Market Analysis and Prediction for Nifty50 using LSTM Deep Learning Approach," 2022 2nd International Conference on Innovative Practices in Technology and Management (ICIPTM), Gautam Buddha Nagar, India, 2022, pp. 156-161, doi: 10.1109/ICIPTM54933.2022.9754148.

3) S. Mehtab and J. Sen, "Stock Price Prediction Using CNN and LSTM-Based Deep Learning Models," 2020 International Conference on Decision Aid Sciences and Application (DASA), Sakheer, Bahrain, 2020, pp. 447-453, doi: 10.1109/DASA51403.2020.9317207.

4) Minnoor, Niveditha, and G. Shobha. "Nifty price prediction from Nifty SGX using machine learning, neural networks and sentiment analysis." 2021 7th International Conference on Computer and Communications (ICCC). IEEE, 2021.

Chapter 3 System Specifications

3.1 System Block Diagram



3.2 Project Specifications

1. **System Architecture:**

   The system Architecture includes the use of Rubiscape Platform for the forecasting of Nifty Closing Price Prediction

2. **Software Requirements:**

   We have used python as the foundational programming language for the algorithms and forecasting models.

3. **Functional Requirements:**

   The functionalities can be derived form the specific input columns like the Date, Open, Close, High, Low, Close, Adji Close, Volume.

4. **Data Requirements:**

   The Data set is been processed, sorted and cleaned prior to the forecasting so that there won't be any anomaly during the prediction

5. **User Interface (UI) Design:**

   The final output is compiled using The Rubiscape' s Dashboard utility and all the forecasted value and related data has been deployed

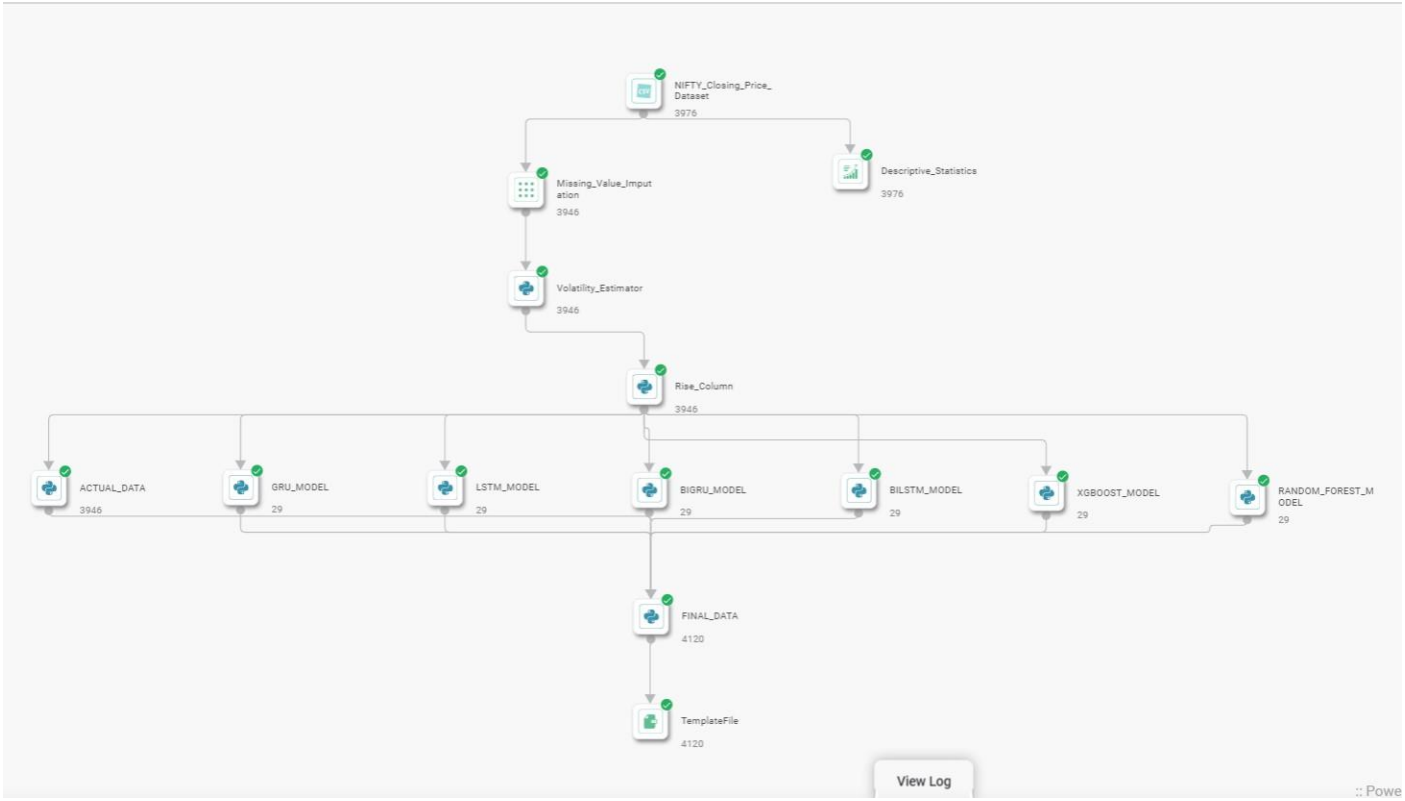
6. **Dependencies:**

   All Forecasting and Deep learning Libraries are required for proper working of algorithms

3.3 Complexities Involved

This project entails navigating several complexities inherent to predicting stock prices for the Nifty 50 Index. Challenges include ensuring the quality of historical data, selecting and fine-tuning appropriate forecasting models, mitigating overfitting in dynamic markets, and adapting to non-stationary behaviors. Interpretability of complex models, computational resource demands, and the ethical considerations of potential biases in predictions further complicate the landscape. Real-time prediction and adherence to regulatory compliance add additional layers of intricacy, while the continuous monitoring and updating of models to reflect evolving market conditions present ongoing challenges. Successfully addressing these complexities necessitates a multidisciplinary approach, combining expertise in finance, data science, technology, and regulatory compliance.

Chapter 4 System Design



Chapter 5 System Algorithm/Models

In the Project we have used a total of 6 forecasting Models: Gated Recurrent Unit (GRU), Long-and-Short-Term Memory (LSTM), Bidirectional GRU, Bidirectional LSTM, XGBoost, Random Forest. All these models have delivered accurate and precise prediction for the Nifty Closing Prediction of 7 days from the last value of the data set.

1) Gated Recurrent Unit (GRU)

Gated Recurrent Unit (GRU) is a type of recurrent neural network (RNN) that was introduced by Cho et al. in 2014 as a simpler alternative to Long Short-Term Memory (LSTM) networks. Like LSTM, GRU can process sequential data such as text, speech, and time-series data.

The basic idea behind GRU is to use gating mechanisms to selectively update the hidden state of the network at each time step. The gating mechanisms are used to control the flow of information in and out of the network

2) Long-and-Short-Term Memory (LSTM)

A traditional RNN has a single hidden state that is passed through time, which can make it difficult for the network to learn long-term dependencies. LSTMs address this problem by introducing a memory cell, which is a container that can hold information for an extended period. LSTM networks are capable of learning long-term dependencies in sequential data, which makes them well-suited for tasks such as language translation, speech recognition, and time series forecasting. LSTMs can also be used in combination with other neural network architectures, such as Convolutional Neural Networks (CNNs) for image and video analysis.

3) Bidirectional GRU

A Bidirectional GRU, or BiGRU, is a sequence processing model that consists of two GRUs. one taking the input in a forward direction, and the other in a backwards direction. It is a bidirectional recurrent neural network with only the input and forget gates

4) Bidirectional LSTM

Bidirectional LSTM or BiLSTM is a term used for a sequence model which contains two LSTM layers, one for processing input in the forward direction and the other for processing in the backward direction. It is usually used in NLP-related tasks. The intuition behind this approach is that by processing data in both directions, the model is able to better understand the relationship between sequences (e.g. knowing the following and preceding words in a sentence).

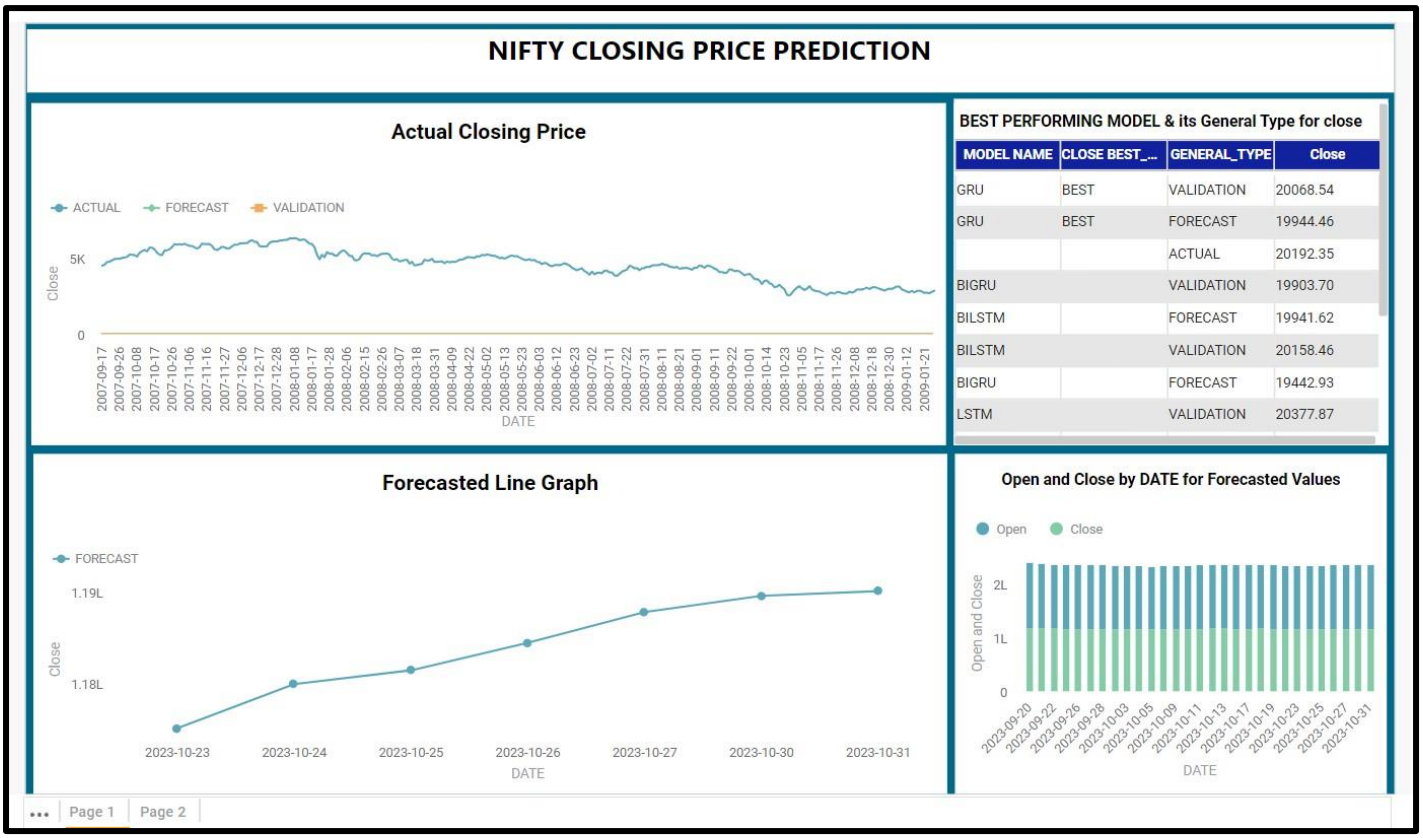
5) XGBoost

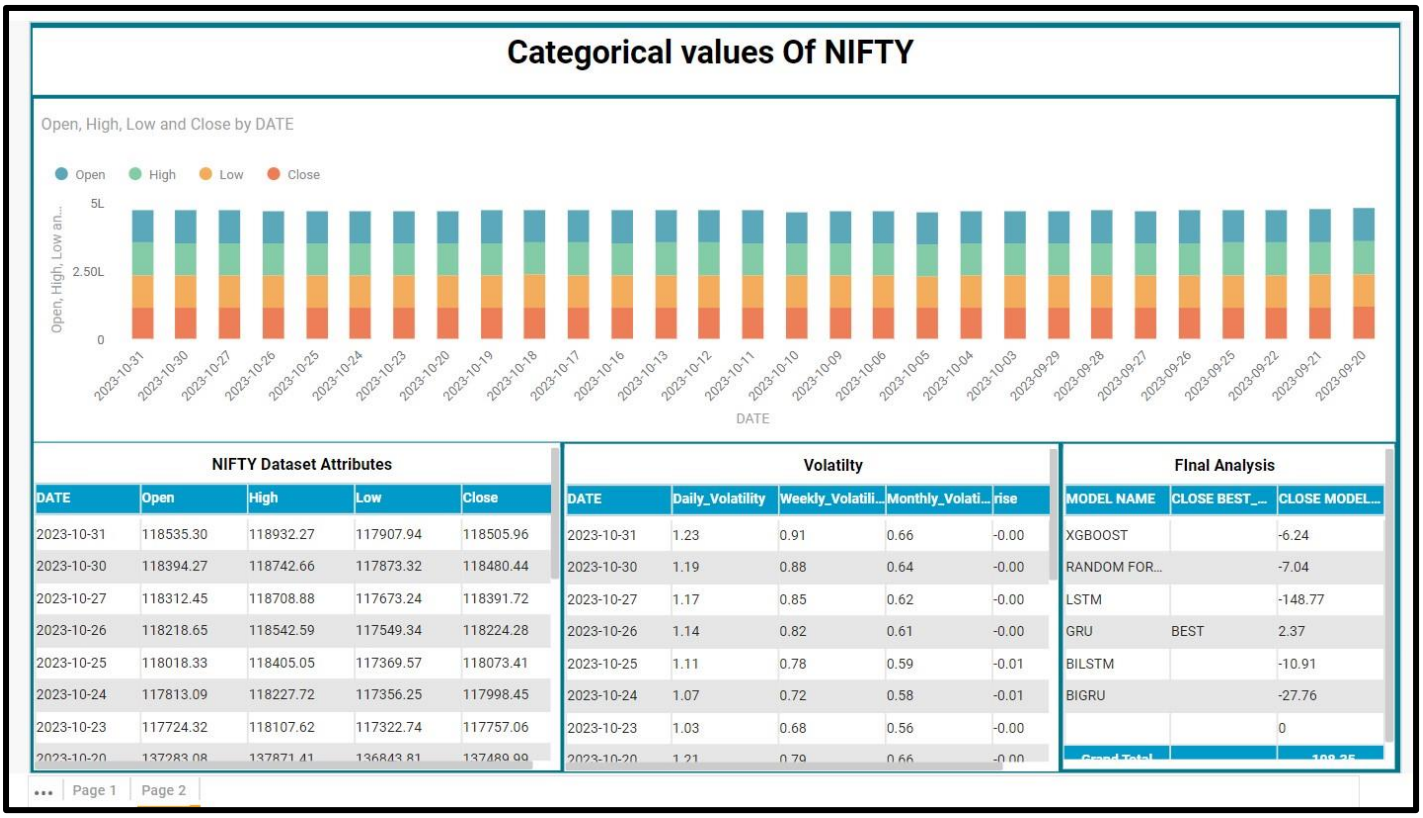
XGBoost is an optimized distributed gradient boosting library designed for efficient and scalable training of machine learning models. It is an ensemble learning method that combines the predictions of multiple weak models to produce a stronger prediction. XGBoost stands for "Extreme Gradient Boosting" and it has become one of the most popular and widely used machine learning algorithms due to its ability to handle large datasets and its ability to achieve state-of-the-art performance in many machine learning tasks such as classification and regression.

6) Random Forest

Random Forest Regression is a versatile machine-learning technique for predicting numerical values. It combines the predictions of multiple decision trees to reduce overfitting and improve accuracy. Python's machine-learning libraries make it easy to implement and optimize this approach

Chapter 6 Dashboard





Chapter 7 Observations

The use of multiple models for forecasting and predicting the future closing prices have made us to get more information about how all the models perform about forecasting and also getting accurate values. The Final output algorithm compares all the forecasting models and combines actual stock data with the forecasted data and categorizes thee data for further analysis. It also identifies the best performing model based on MAPE. The output of the CSGenerator function appears to be crucial for understanding the data types and variable types of the Data Frame columns.

While the all the other forecasting models gave accurate values but the output of Gated Recurrent Unit (GRU) forecasting model was the best in training and testing the actual data and validating it and most important in giving the best and most accurate forecasted values. The GRU has proved to be the best model to used more and refined according to similar data set in future by optimizing the categorical and numerical values.

From the completion of the forecasting, we can infer that with a large data set after cleaning and preprocessing we can predict the stock prices on the basis of the key attribute like the closing price, opening price, high price or low price, by just changing some code snippets. This helps the stock brokers and investors to have a better idea of the stock market and predict future aspects

Chapter 8 Conclusion

In this Report, we have proposed six deep learning-based regression models for the prediction of NIFTY 50 closing values. Our propositions LSTM, GRU, BiLSTM, BiGRU, XGBoost, and Random Forest. The models were built, optimized, and then tested on the daily index values of NIFTY 50. While all the models exhibited high levels of accuracy in their forecasting performance, the univariate Gated Recurrent Unit (GRU with previous data as its input, was found to be the most accurate model.

Chapter 9 Applications

9.1 Application areas

Our forecasting Models have demonstrated accurate values and predicted the best outcome. Taking into consideration these models with the help of more lengthy data set and robust training and testing this can be used in applications like:

1) Prediction of different value columns like OPEN, CLOSE, HIGH, LOW
2) Forecasting on different data set can be performed using the model demonstrated
3) Scams related to Stock Market can be prevented by predicting the future values and cross checking it with the actual market values
4) Utilized for more research work on companies and organizations for creating a better market portfolio.
5) Used for educational research purposes.

9.2 Advantages

1) Fast Accurate and more Precise Prediction
2) Prediction on different data set
3) Optimized to different Stock Markets
4) More secure with parallel forecasting
5) Combing different models at one place

9.3 Disadvantages

1) Can be misused for false rumors about predictions
2) The capability of this model with Quantum computing is still on the research part and yet unknown
3) More complexities with large data set
4) parallel model require for multiple stock datasets

Chapter 10 References

https://www.bing.com/search?q=Nifty+closing+price+prediction+projects&form=ANNTH1&refig=1f65403871f74e3a855b2d07d6215acb&pc=ASTS

Nifty 50 Index Trade Ideas — NSE:NIFTY — TradingView — India

(PDF) Closing Price Prediction of Nifty Stock Using LSTM with Dense Network (researchgate.net)

https://www.tandfonline.com/doi/full/10.1080/08839514.2022.2111134

https://ieeexplore.ieee.org/document/9754148

https://ieeexplore.ieee.org/abstract/document/9317207

https://www.researchgate.net/publication/357908545_Nifty_Price_Prediction_from_Nifty_SGX_using_Machine_Learning_Neural_Networks_and_Sentiment_Analysis

https://www.mdpi.com/1911-8074/16/10/423

https://dl.acm.org/doi/10.1145/3590837.3590919

https://journalofbigdata.springeropen.com/articles/10.1186/s40537-020-00333-6