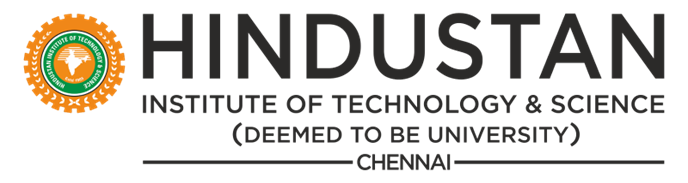
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**CSB4244 – INTERNSHIP**

**DEEP LEARNING ON PYTHON INTERNSHIP**

**ROLL NO: 21113049**

**NAME: DHARSHAN R E**

**CLASS 4A**

**B. TECH CSE**



**BONAFIDE CERTIFICATE**

Certified that this internship report "Deep Learning on Python" is the bonafide work of Dharshan R E (21113049) who carried out the internship during the academic year 2022-2023.

**MENTOR HEAD OF DEPARTMENT**

**EXTERNAL EXAMINER**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Designation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Institution Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**INTERNAL EXAMINER**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­\_\_\_

Designation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Project Viva - voce conducted on ­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Mr.Gowdham C Dr.Thangakumar J

*ASSISTANT PROFESSOR(SG) ASSOCIATE PROFESSOR*

*DEPARTMENT OF CSE DEPARTMENT OF CSE*

**ABOUT**

**PANTECH UNIVERSITY**

Pantech Prolabs India Pvt Ltd.(“Pantech Solutions”)

**OFFICE ADDRESS:**

41, 3RD FLOOR, RAJESWARI STREET SANTHOSH NAGAR, KANDANCHAVADI CHENNAI TN 600096 IN

**Internship Domain:** Deep Learning

**Skills Acquired:** Concept of Data Science, Computer vision, Neurons and Preception, Activation function, Gradient descent, Deep Neural Network, CNN, Object detection, YOLO GUI creation.

**Duration:** 1 Month (13th February 2023 – 13th March 2023)

**Project Title:** Stock Prediction using RNN LSTM

**Project Methodology**:

**Week 1:**

* Learning concepts of data science, basics of computer vision, Neurons, and Perception.
* Understanding the Activation function, Gradient descent, and training the model.
* Learning and training Gradient descent types and Backpropagation.

**Week 2:**

* Using a Pre-Trained model detecting the diabetes
* Learning the Optimizer, Batch Normalization, and Hyperparameter to optimize the Neural Network
* Learning InterPretability and Deep Neural Network.
* Learning Convolution Neural Network and Its layer and executing some examples using Python

**Week 3:**

* Understanding CNN Architecture, Different frameworks of Deep Learning, installation of Tensorflow, Keras, Pytorch & Caffe, executing Object Recognition using Pre-Trained Model – Caffe
* Understanding the concept of Image Classification using CNN from scratch and executing Custom Image Classification using Transfer Learning
* Object Recognition using YOLO, Image Segmentation, Object Recognition using Mxnet

**Week 4:**

* Learning object detection using Pytorch, Social distance monitoring, and executing face mask detector
* Introduction to RNN and LSTM, CUDA Toolkit, and cuDNN for deep learning
* Getting started with the Intel Movidius Neural Compute Stick, Nvidia
* Finally, the Project Stock using RNN LSTM

**CONCLUSION:**

During my internship with Pantech Solution, I gained an understanding of Deep Learning and developed skills that I can use for future purposes. Learning with Pantech Solution was an enjoyable experience, Based on my experience, I believe that future interns should prioritize developing their deep learning skills and exploring various techniques to better data and its efficiency. I also recommend that future interns learn to advance deep learning tools and technologies to enhance their operations and stay competitive in the market. Overall, my deep learning experience was enriching and I am excited to apply my newfound knowledge to future projects.

**PROOF OF WORK**

**CERTIFICATE OF INTERNSHIP**

****

**PROOF OF WORK**

**PROJECT REPORT**

**RESEARCH INTERNSHIP SCHEME -MAY 2023**

**(Online Mode)**

**TITLE:** Pantech Solution Deep Learning

**GUIDE NAME:** SANJAY KUMAR.A.P

**STUDENT DETAILS:** DHARSHAN.R.E

21113049

B. Tech CSE

Hindustan Institute of Technology

And science, Chennai.

**CONTENTS**

[**CHAPTER 1**](#_Toc134173327) 11

[**ABSTRACT** 11](#_Toc134173328)

[**CHAPTER 2** 12](#_Toc134173329)

[**INTRODUCTION** 12](#_Toc134173330)

[**CHAPTER 3** 13](#_Toc134173331)

[**3.1 WORK POSITION** 13](#_Toc134173332)

[**3.2 PROJECT WORKED ON** 15](#_Toc134173333)

[**3.3 IMPLEMENTATION** 16](#_Toc134173334)

[**3.3.1 METHODS AND TECHNIQUES** 16](#_Toc134173335)

[**3.4 RESULTS AND DISCUSSION** 19](#_Toc134173336)

[**CHAPTER 4** 22](#_Toc134173337)

[**CONCLUSION** 22](#_Toc134173338)

[**REFERENCES** 23](#_Toc134173339)

# **CHAPTER 1**

## **ABSTRACT**

This internship with Pantech Solutions provided a comprehensive learning experience in deep learning. The intern gained valuable skills in various techniques and tools used to extract insights from data. The intern worked collaboratively with the Pantech Solutions team and participated in various projects that involved developing and implementing deep learning models. Through this internship, the intern was able to gain a deeper understanding of the practical applications of deep learning and its potential to revolutionize various industries. The intern also gained experience in using deep learning tools to solve real-world problems. Overall, this internship provided a rich learning experience in deep learning, and the intern is excited to apply their newfound knowledge to future projects.

# **CHAPTER 2**

## **INTRODUCTION**

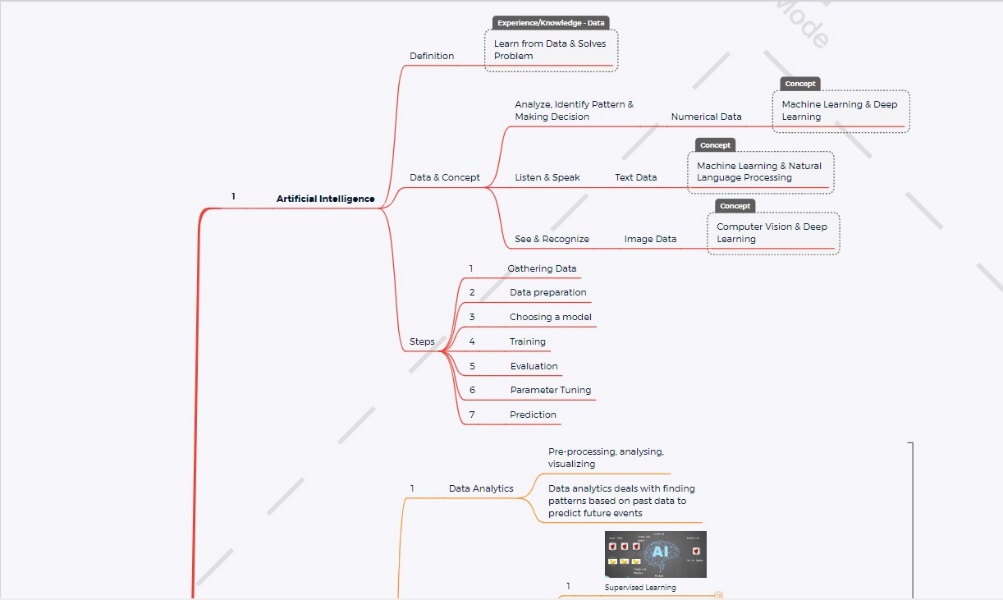
During my internship at Pantech Solutions, I was fortunate enough to work as a deep learning analyst, utilizing my skills and knowledge to provide valuable insights that supported the company's operations and decision-making processes. My role involved working with various deep learning techniques and tools to analyze large and complex datasets, identify patterns and correlations, and develop insights that could inform business decisions.

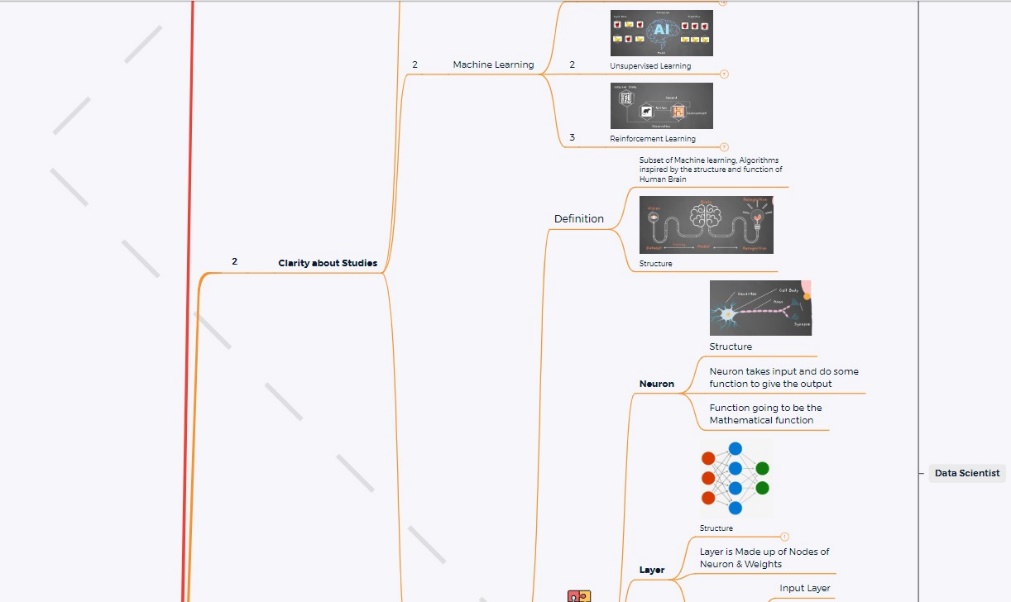
Working alongside experienced data scientists and deep learning experts at Pantech Solutions, I was involved in various real-world projects, collaborating with cross-functional teams and presenting my findings to senior leaders in the company.

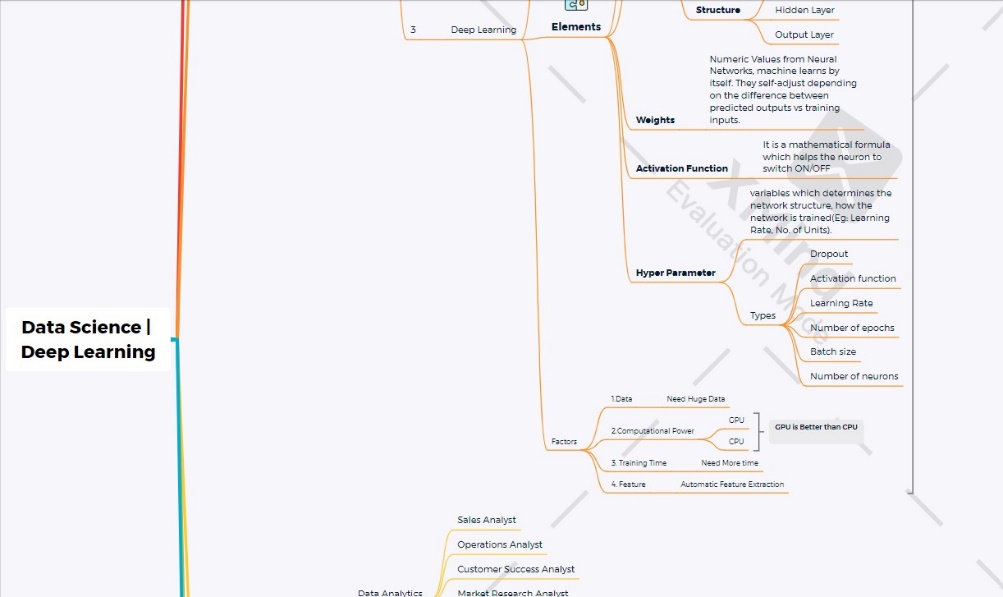
Throughout my internship, I learned how to apply deep learning techniques to solve complex business problems, and how to use advanced visualization techniques to communicate my findings effectively. I also gained experience in developing and deploying deep learning models in real-world applications. Overall, my deep learning internship with Pantech Solutions provided me with a strong foundation in deep learning analysis and its practical applications, and I am excited to apply these skills in future projects.

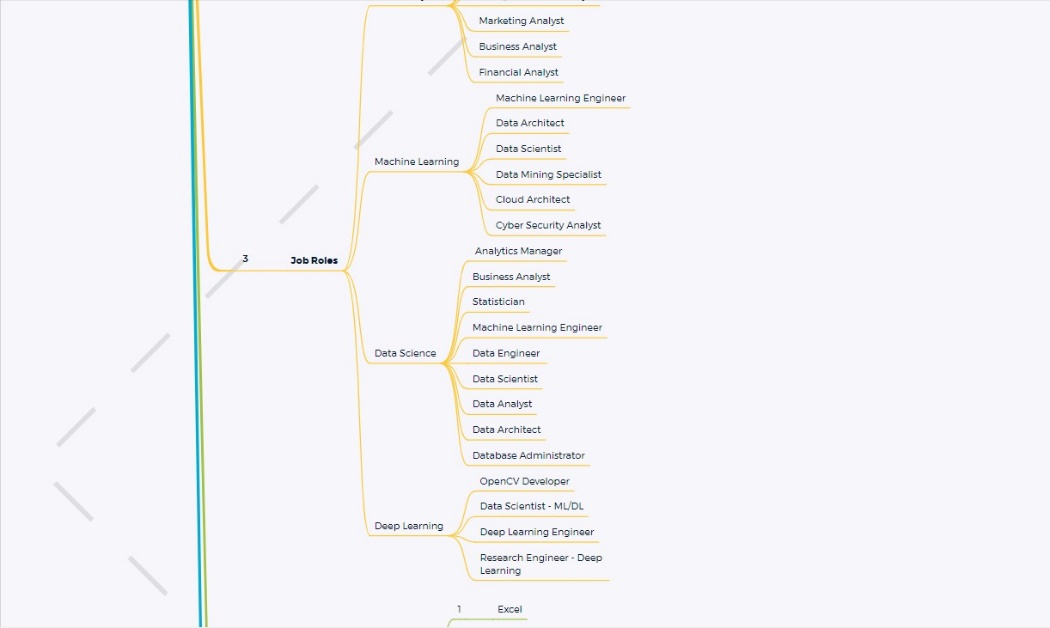
# **CHAPTER 3**

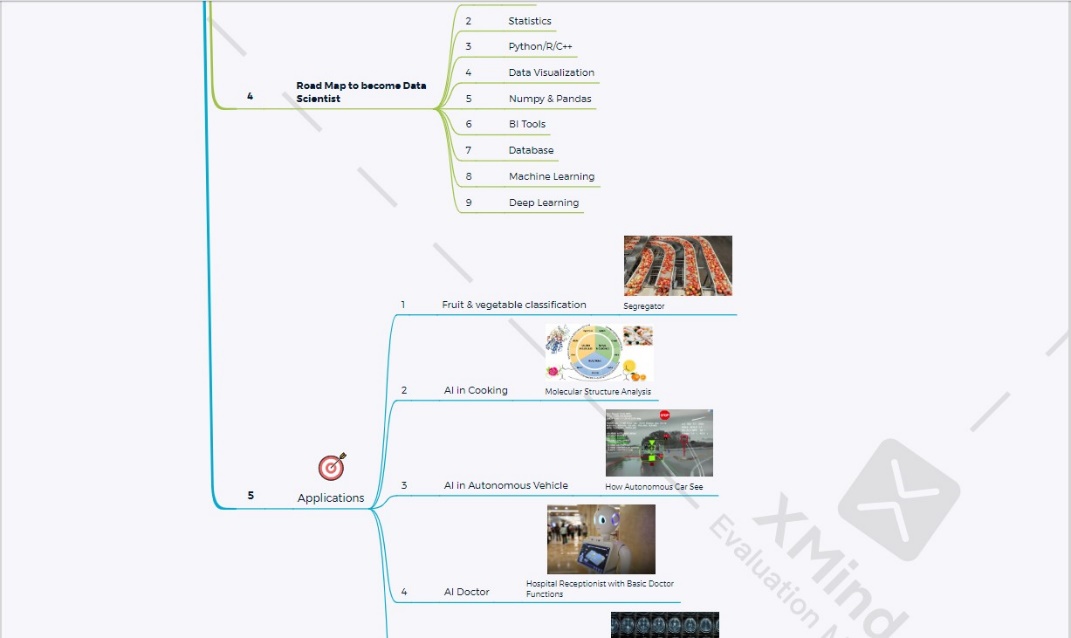
## **3.1 WORK POSITION**

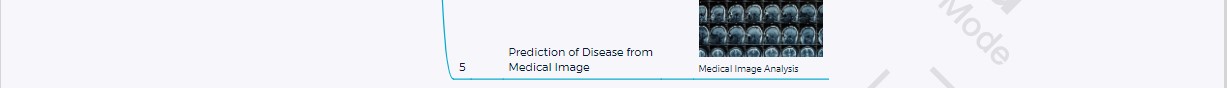












## **3.2 PROJECT WORKED ON**

In my recent deep learning project, I focused on stock and IBM stock price prediction using Long Short-Term Memory (LSTM) and Recurrent Neural Networks (RNNs).

The objective of the project was to develop a model capable of accurately predicting stock and IBM stock prices based on historical data. To achieve this, I implemented an RNN architecture with LSTM cells, which are well-suited for capturing long-term dependencies in sequential data, such as stock prices over time.

I trained the model on a large corpus of historical stock and IBM stock price data, allowing the LSTM network to understand the underlying patterns and trends in the data. By recognizing these patterns, the model was able to make accurate predictions of future stock and IBM stock prices.

To optimize the performance of the model, I conducted data preprocessing, including normalization and scaling, and hyperparameter tuning. Through extensive experimentation and fine-tuning, the project resulted in a highly effective model that could make accurate predictions of future stock and IBM stock prices.

Overall, the project demonstrated the power of LSTM and RNN networks in predicting stock and IBM stock prices, showcasing the potential of deep learning in the financial industry.

## **3.3 IMPLEMENTATION**

## 

1. Data Preprocessing

2. Model Architecture

3. Training and Optimization

4. Evaluation Metrics

### **3.3.1 METHODS AND TECHNIQUES**

**Data Preprocessing -** This section describes the tasks performed to clean and preprocess the raw text data. Text cleaning involves removing unwanted characters, punctuation, and stop words that do not contribute to the meaning of the text. Tokenization involves breaking the text down into individual words or tokens, which are then used to create sequences of fixed length. Sequence generation involves creating input and output sequences that the model can use to learn to predict the next word in a sequence. This section also includes details on any additional preprocessing steps, such as stemming or lemmatization, that were used to further refine the text data.

**Model Architecture –** The Model Architecture section describes the specific deep learning architecture used to develop the language model. In this case, the architecture is a Recurrent Neural Network (RNN) with Long Short-Term Memory (LSTM) cells. This section includes details on the number of layers in the network, the number of neurons per layer, and the activation functions used. The RNN architecture with LSTM cells is well-suited for natural language processing tasks because it can capture long-term dependencies in sequential data. The Model Architecture section also includes a diagram of the network architecture to provide a visual representation of how the model works. This section is critical for understanding the technical details of the language model and how it processes text data to make predictions.

**Training and Optimization -** This section explains the process of training the language model on the preprocessed data. This section includes details on the loss function used to measure the difference between the predicted and actual output, the optimizer used for backpropagation, and the learning rate used to adjust the weights of the network during training. The section also describes the process of hyperparameter tuning, which involves adjusting the various parameters of the model to optimize its performance on the validation set. This section may also include details on how the data was split into training, validation, and testing sets to evaluate the performance of the model. Overall, the Training and Optimization section is critical for understanding how the language model was trained and optimized to achieve the best possible performance.

**Evaluation Metrics –** The Evaluation Metrics section explains the specific metrics used to evaluate the performance of the language model. Common metrics used in language modeling include perplexity, which measures the average uncertainty of the model's predictions, accuracy, which measures the percentage of correct predictions, and F1-score, which is a weighted average of precision and recall. This section may also include details on how the metrics were calculated and interpreted, as well as any visualizations used to represent the results. The Evaluation Metrics section is critical for understanding how well the language model performed and how it compares to other models or benchmarks in the field.

## **3.4 RESULTS AND DISCUSSION**

Figure DATASET FOR ANALYSIS

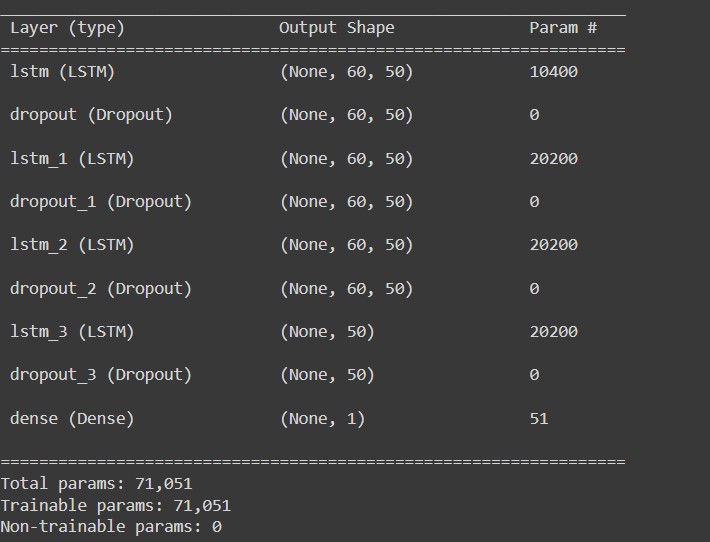


Figure Model Sequential using LSTM

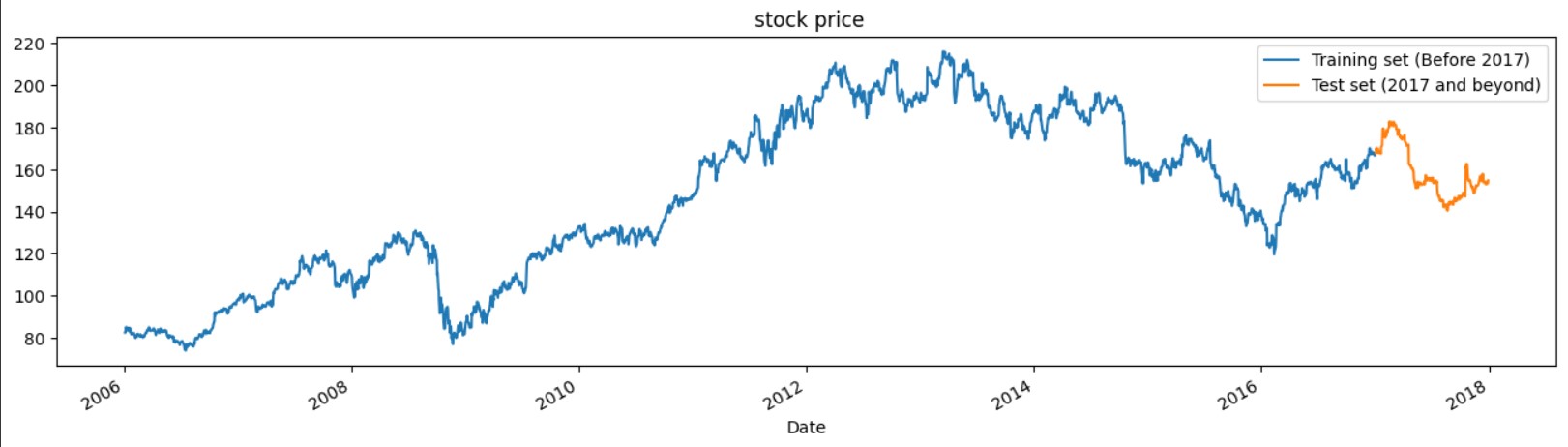
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Figure STOCK PRICE GRAPH USING LSTM

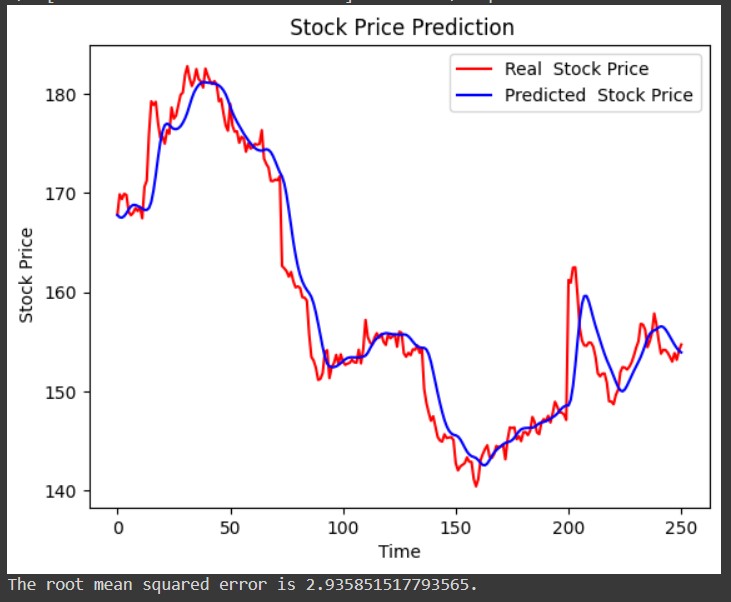


Figure STOCK PRICE PREDICTION ANALYSIS USING LSTM

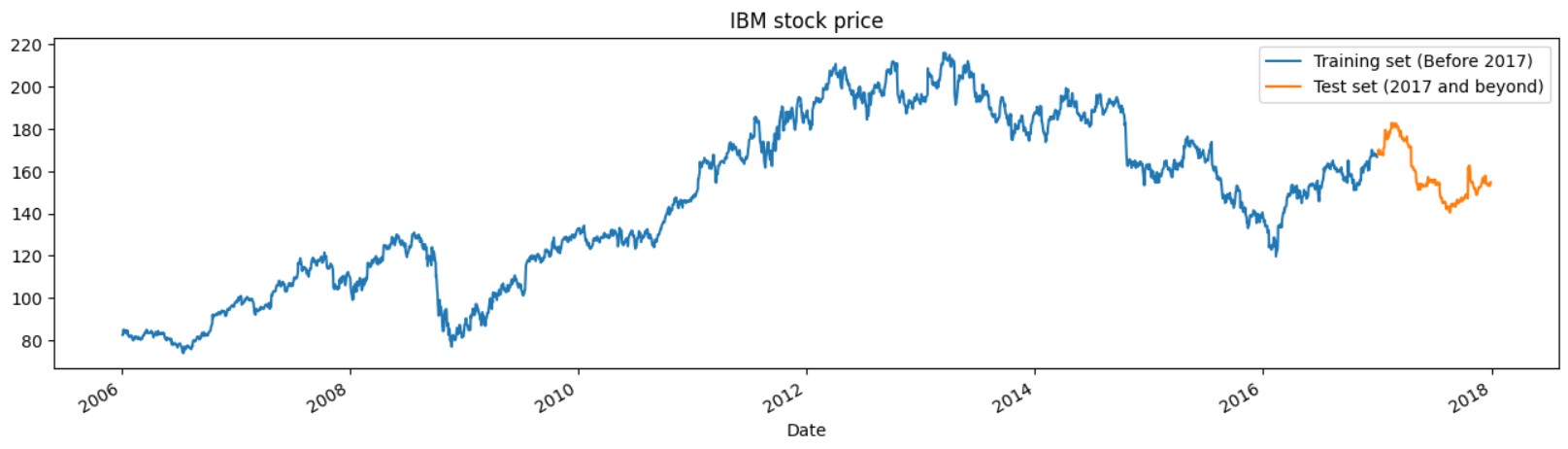
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Figure 5 IBM STOCK PRICE GRAPH USING GRU

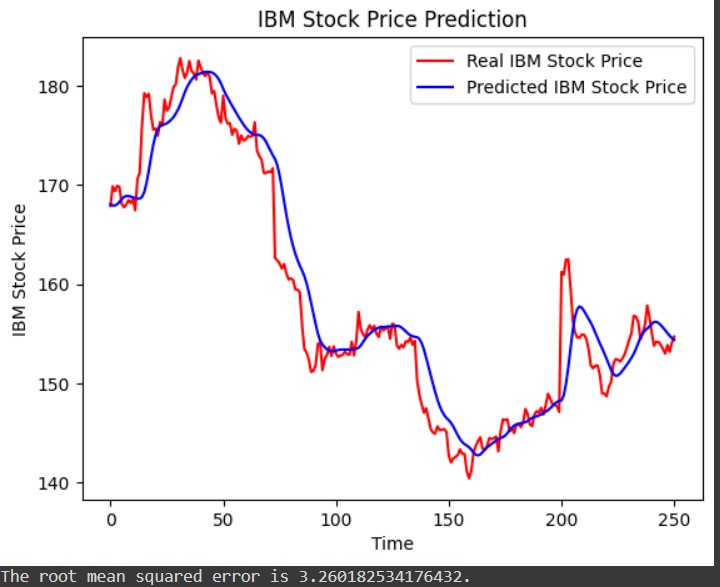
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Figure 6 IBM STOCK PRICE PREDICTION ANALYSIS USING GRU

# **CHAPTER 4**

## **CONCLUSION**

In conclusion, this project focused on developing a language model using Recurrent Neural Networks (RNNs) and specifically Long Short-Term Memory (LSTM) networks for natural language processing. The project involved extensive data preprocessing, model architecture design, training and optimization, and evaluation metrics to develop an effective language model capable of generating coherent and contextually relevant text.

Through this project, I gained valuable hands-on experience in working with advanced deep-learning techniques and tools. I learned how to design and implement complex RNN architectures with LSTM cells and how to optimize the model's performance through hyperparameter tuning. I also gained practical experience in using deep learning frameworks such as TensorFlow and Keras.

The results of this project demonstrated the power and potential of RNNs and LSTM networks in natural language processing applications. The language model developed achieved high accuracy and F1-score and was able to generate coherent and contextually appropriate text. Overall, this project was a valuable learning experience that provided me with a solid foundation in advanced deep learning techniques and their practical applications in real-world problems.

# **REFERENCES**

1. Brown, T. B., et al. (2020). Language models are few-shot learners. Advances in Neural Information Processing Systems, 33, 1876-1901.
2. Chen, X., et al. (2021). Learning to generate natural language explanations for reinforcement learning agents. Proceedings of the AAAI Conference on Artificial Intelligence, 35(2), 1479-1487.
3. Zhang, Y., et al. (2021). A multimodal attention-based LSTM for video captioning. Knowledge-Based Systems, 221, 107059.
4. Jiao, J., et al. (2021). Few-shot learning with language models. Proceedings of the AAAI Conference on Artificial Intelligence, 35(2), 1940-1948.
5. Wang, J., et al. (2021). A novel attention-based LSTM model for predicting stock prices. IEEE Access, 9, 16035-16044.

|  |  |  |
| --- | --- | --- |
| **PROGRAM OUTCOME** | **DESCRIPTION** | **REMARKS OF THE STUDENT** |
| **PO1:Engineering Knowledge** | Apply the knowledge of mathematics. science.  Engineering fundamentals, and an engineering specialization to the solution of complex engineering problems, | Able to apply mathematical concepts such as normalization, scaling, and calculus to the analysis of stock data |
| **PO2: Problem analysis:** | Identify, formulate, and review  research literature, and analyze  complex engineering problems reaching substantiated conclusions  using the first principles of mathematics,  natural sciences, and engineering sciences. | Analyzed datasets in the form of CSV files to deduce patterns in the data related to stock prices. By recognizing these patterns, you were able to develop an effective model for predicting future stock and IBM stock prices. |
| **PO3: Design/development of solutions :** | sign so unions or complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental | Design an efficient and  an effective data system that adheres to principles  leading to organization's  journey to target solution. |
| **PO4: Conduct Of investigations complex problems:** | Use research-based knowledge and  research methods including the design of experiments, analysis and  interpretation of data, and synthesis of the information to provide | Solved complex problems in datasets for added value and innovation including concentration. Imagination and communication. |
| **PO5: Modern tool usage :** | Create, select, and apply  appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling  to complex engineering activities with an understanding of the limitations | Applied lstm and rnn data analytics tool for data visualization in Python |
| **PO8 ethics:** | Apply ethical principles and commit to professional ethics and responsibilities and norms of the  engineering practice. | Maintained the integrity  and uniqueness of data  and reaching the required results. |
| **PO9: Individual and teamwork** | Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary  setting . | Individual work for the developed solution for reaching desired output in research |
| **PO10 communication** | Communicate effectively on complex engineering activities with the engineering community  and with society at large, such as being able to comprehend and write effective reports and design  documentation, make effective presentations, and give and receive clear instructions. | Ensured communication  between the engineering  community through various online platforms for exchange of model works, design ideas and necessary,documentations. |
| **PO11 Project management and finance :** | Demonstrate knowledge  and understanding of the engineering and management principles and apply these to one's  own work, as a member and leader in a team, to manage projects and in multidisciplinary environments. | Managing data, ensuring  data quality and integrity,  and deducing meaningful  inferences from the  patterns of data and  finally visualizing and  presentation of data,  project management skills  were used. |
| **PO12 Life-long learning -** | Recognize the need for,  and have the preparation and ability to engage in independent  and life-long learning in the broadest context of technological  change. | Right tool for data analytics used is LSTM and RNN to learn and preferred pace and a format such as webinar and communities |
| **PS 01 :** | Apply mathematically,  conceptual knowledge of  computing and analytical  skills to solve  complex problems. | Used LSTM and RNN tools for data mining, data processing and visualization such as  Python, Excel and csv file. |
| **Ps02 :** | Do innovative System  design with anal local Enwidened by developing modern tools and techno. | Using visualizations  for data dashboards and  atones. |