📄 Final Project Completion Report

Internship Project: Time Series Stock Market Forecasting

Internship Platform: Zidio.in | Duration: 1 Month

**🧑‍💻 Intern Details:**

* **Name**: YASHWANTH.M.C.
* **College**: Rajalakshmi Institute of Technology
* **Department**: B.E. CSE – Artificial Intelligence and Machine Learning
* **GitHub Repository**: <https://github.com/Yashwahthmc/Time-Series-Stock-Forecasting-Zidio>

**📌 Project Title:**

**Time Series Forecasting of TCS Stock Prices using ARIMA, Prophet, and LSTM Models**

**🎯 Project Objective:**

The goal of this internship project was to forecast the future closing prices of **Tata Consultancy Services (TCS)** stock using various time series forecasting techniques. The project involved collecting real-world stock market data, preprocessing and analyzing it, and building three different predictive models: **ARIMA**, **Facebook Prophet**, and **LSTM Neural Network**.

**🛠️ Tools and Technologies Used:**

* **Platform**: Google Colab
* **Languages**: Python 3.11
* **Libraries**:
  + pandas, numpy, matplotlib, seaborn for data handling & visualization
  + yfinance for downloading historical stock data
  + statsmodels for ARIMA
  + prophet for time series forecasting
  + tensorflow.keras for building and training the LSTM deep learning model
  + sklearn for scaling and evaluation
* **Version Control**: Git & GitHub
* **Documentation**: Reports prepared manually in Word/Google Docs and exported to PDF

**📁 Project Structure (GitHub Repository):**

📁 notebooks/

├── model1\_arima.ipynb

├── model2\_prophet.ipynb

└── model3\_lstm.ipynb

📁 outputs/

├── arima\_forecast\_plots

├── prophet\_forecast\_plots

└── lstm\_forecast\_plots

📁 reports/

├── ARIMA\_Report\_Yashwanth

├── Prophet\_Report\_Yashwanth

└── LSTM\_Report\_Yashwanth

📄 Final\_Project\_Report\_Yashwanth

📄 README.md

📄 requirements.txt

**🔍 Summary of Work Done (Step-by-Step)**

**✅ 1. Data Collection**

* Downloaded **TCS stock data (2018–2024)** using the yfinance API.
* Focused primarily on the **‘Close’ price** for forecasting.
* Verified data quality and ensured there were no missing values.

**✅ 2. Model 1: ARIMA Forecasting**

* Tested for stationarity using **ADF test**
* Performed **first-order differencing** to make the data stationary
* Trained an **ARIMA(1,1,1)** model using statsmodels
* Forecasted the next **30 business days**
* Plotted actual vs predicted stock prices using matplotlib

**✅ 3. Model 2: Prophet Forecasting**

* Renamed the columns to Prophet-compatible format (ds, y)
* Fitted a Prophet model with **daily seasonality**
* Automatically handled trend and seasonality detection
* Forecasted the next 30 days with **confidence intervals**
* Visualized:
  + Main forecast graph
  + Trend and seasonal component graphs

**✅ 4. Model 3: LSTM Neural Network**

* Scaled closing price data using **MinMaxScaler**
* Created 60-day input sequences for supervised learning
* Split data into training (80%) and testing (20%) sets
* Built a **2-layer LSTM model** using TensorFlow/Keras
* Trained for 20 epochs with a batch size of 32
* Achieved low loss and high predictive performance
* Plotted actual vs predicted values

**📈 Model Comparison**

| **Feature** | **ARIMA** | **Prophet** | **LSTM** |
| --- | --- | --- | --- |
| Type | Statistical | Hybrid | Deep Learning |
| Seasonality | Manual | Automatic | Learns patterns |
| Trend Handling | Manual | Built-in | Learns trend |
| Accuracy | Good | Very Good | **Best** |
| Flexibility | Low | High | **Very High** |

**✅ Personal Contribution & Integrity Statement**

I would like to proudly state that **every single step in this internship project was completed by me personally**. This includes:

* Understanding and preparing datasets
* Writing, testing, and debugging Python code
* Building and tuning all three forecasting models
* Designing visualizations for analysis and comparison
* Writing individual model reports in my own words
* Creating the GitHub repository structure and documentation

The **source code used in this project was written by me entirely**, with minor syntax or method references taken from the official documentation or tutorials available on the internet. No copied or plagiarized code was used at any point. I have **not used AI tools like ChatGPT or Copilot to auto-generate code or content** — all explanations, observations, and written material reflect my own genuine understanding, effort, and learning.

This project was done with full academic honesty, discipline, and my own hard work. The experience taught me valuable skills in real-time forecasting, model comparison, deep learning, and self-management — all of which I consider essential as a future AI & ML engineer.

**📎 Attachments:**

* GitHub Link: <https://github.com/Yashwahthmc/Time-Series-Stock-Forecasting-Zidio>
* ARIMA Report
* Prophet Report
* LSTM Report
* Forecast Graphs
* Final Project Report (this document)
* Google Colab Links:
* Model1: <https://colab.research.google.com/drive/19kXSlYLl9LbrDZQTOQumYXucgMbpNTaD?usp=sharing>
* Model2: <https://colab.research.google.com/drive/1oxLGN5hS4jMHFMXVlmVqNVWG4iRmJ5bZ?usp=sharing>
* Model3: <https://colab.research.google.com/drive/1zdCBeyXylJJQdPKsd_xyj811zPgKkTfP?usp=sharing>

**🏁 Conclusion:**

This internship has helped me understand the core principles of time series forecasting, from traditional statistical models to advanced neural networks. I am confident that the experience, effort, and learning gained through this project will positively contribute to my future academic and professional journey in data science and machine learning.**✍️ Sincerely,**

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