📄 Task Report: Forecasting TCS Stock Prices using Facebook Prophet

Internship Project – Time Series Stock Market Forecasting

Platform: Zidio.in | Duration: 1 Month

**🧑‍💻 Intern Details:**

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* **College**: Rajalakshmi Institute of Technology, Chennai
* **Department**: B.E. CSE – Artificial Intelligence and Machine Learning
* **Project**: Stock Price Prediction using ARIMA, Prophet, and LSTM
* **Model Focus**: Model 2 – **Prophet Forecasting**

**🎯 Objective**

To use the **Facebook Prophet** time series model to predict the next 30 business days of **TCS stock prices**.  
Prophet is known for its ability to model **trend, seasonality, and holidays** effectively, especially on business and financial data.

**📦 Tools Used**

* Python 3.11 (Google Colab)
* yfinance, Prophet, pandas, matplotlib
* Data source: Yahoo Finance (TCS.NS, Jan 2018 – Dec 2024)

**🧪 Methodology**

1. ✅ **Data Loading**
   * Downloaded historical stock prices for TCS from Yahoo Finance using yfinance
   * Selected only the Date and Close columns
2. ✅ **Data Preprocessing**
   * Renamed columns to ds (date) and y (target), as required by Prophet
   * Ensured proper datetime and numeric formatting
   * Removed any missing values
3. ✅ **Model Fitting**
   * Initialized Prophet with daily seasonality
   * Fitted the model to historical closing prices
   * Generated future DataFrame for 30-day forecast
4. ✅ **Visualization**
   * Plotted forecast (historical vs predicted with confidence interval)
   * Plotted components: trend, weekly effects, etc.

**📈 Results**

* **Forecast Period**: Jan–Feb 2025 (30 Business Days)
* **Trend**: Upward and stable
* **Confidence Interval**: Displayed around forecasted line
* **Key Insight**: Prophet effectively modeled the TCS stock's short-term behavior and showed similar trends to ARIMA but with better component visibility.

**🔄 Comparison with ARIMA**

| **Feature** | **ARIMA** | **Prophet** |
| --- | --- | --- |
| Stationarity | Required | Not required (auto-handled) |
| Trend Handling | Manual differencing | Auto additive trend |
| Seasonality | Needs SARIMA tuning | Handled internally |
| Visualization | Basic | Built-in components view |
| Accuracy | Comparable | Interpretable and flexible |

**✅ Conclusion**

The Prophet model provided a clear and interpretable forecast of TCS stock prices.  
Its ability to detect trend and seasonality automatically makes it a strong option for **financial time series forecasting**, especially when compared to classical models like ARIMA.

This model will be compared alongside LSTM in the final stage to determine the most suitable model for this task.

**📂 Attachments:**

* Notebook: Model2\_Prophet\_Forecast.ipynb
* Report PDF: Prophet\_Model\_Report\_Yashwanth
* GitHub Link: <https://github.com/Yashwahthmc/Time-Series-Stock-Forecasting-Zidio.git>
* Google Colab Link: <https://colab.research.google.com/drive/1oxLGN5hS4jMHFMXVlmVqNVWG4iRmJ5bZ?usp=sharing>

**✍️ Signature:**

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