📄 ARIMA Model Forecasting Report

Internship Project – Time Series Stock Market Forecasting

Platform: Zidio.in | Duration: 1 Month

**🧑‍💻 Intern Details:**

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* **Department**: B.E. CSE – Artificial Intelligence and Machine Learning
* **Project**: Time Series Stock Forecasting
* **Model Focus**: Model 1 – **ARIMA Forecasting**

**🎯 Objective**

To forecast the stock prices of **TCS (Tata Consultancy Services)** using the classical **ARIMA model**, by identifying stationarity and using past values to predict future trends.

**📦 Tools Used**

* Google Colab (Python 3.11)
* Libraries: yfinance, pandas, matplotlib, statsmodels
* Dataset: TCS stock price data (Jan 2018 – Dec 2024) from Yahoo Finance

**🔬 Methodology**

**✅ Step 1: Data Collection**

* Used yfinance to download daily TCS stock prices
* Focused on the Close price column

**✅ Step 2: Stationarity Check**

* Applied **Augmented Dickey-Fuller (ADF) test**
* p-value > 0.05 → Non-stationary → Performed **first-order differencing**
* Second ADF test → p-value < 0.05 → Data became stationary ✅

**✅ Step 3: ARIMA Modeling**

* Built ARIMA(1,1,1) model using statsmodels
* Fitted the model on the entire training data

**✅ Step 4: Forecasting**

* Forecasted **30 business days** of stock prices
* Used forecast() method
* Created forecast index from the last available date

**✅ Step 5: Visualization**

* Plotted historical vs forecasted prices
* Red line → ARIMA forecast
* Blue line → Actual historical values

**📈 Results Summary**

| **Metric** | **Value** |
| --- | --- |
| ADF p-value (original) | 0.6611 ❌ |
| ADF p-value (differenced) | 0.0000 ✅ |
| ARIMA model order | (1, 1, 1) |
| Forecast horizon | 30 days |
| Forecast trend | Slight upward trend |

**🟨 Limitations of ARIMA**

* Requires stationarity
* Assumes linear trends
* Does not handle multiple seasonality (like Prophet does)
* Not as adaptive as deep learning models (like LSTM)

**✅ Conclusion**

The ARIMA model was able to model the TCS stock's overall trend after differencing, and the forecast was reliable for short-term predictions. However, its lack of built-in seasonal handling and trend decomposition makes it best suited for stable, linear datasets.

**📂 Attachments**

* Notebook: model1\_arima.ipynb
* Forecast Plot: arima\_forecast\_plots
* Report PDF: ARIMA\_Report\_Yashwanth
* GitHub Link: https://github.com/Yashwahthmc/Time-Series-Stock-Forecasting-Zidio.git
* Google Colab Link: <https://colab.research.google.com/drive/19kXSlYLl9LbrDZQTOQumYXucgMbpNTaD?usp=sharing>

**✍️ Signature:**

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