



Time Series Forecasting of AAPL Stock Prices Using ARIMA

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Problem Statement

To build a time series model that forecasts future stock prices of Apple Inc. using historical data.

The model should:

Analyze trends and seasonality

Ensure stationarity

Provide accurate short-term forecasts

Assist in understanding price movement dynamics



Project Objectives

Perform EDA on AAPL stock price data

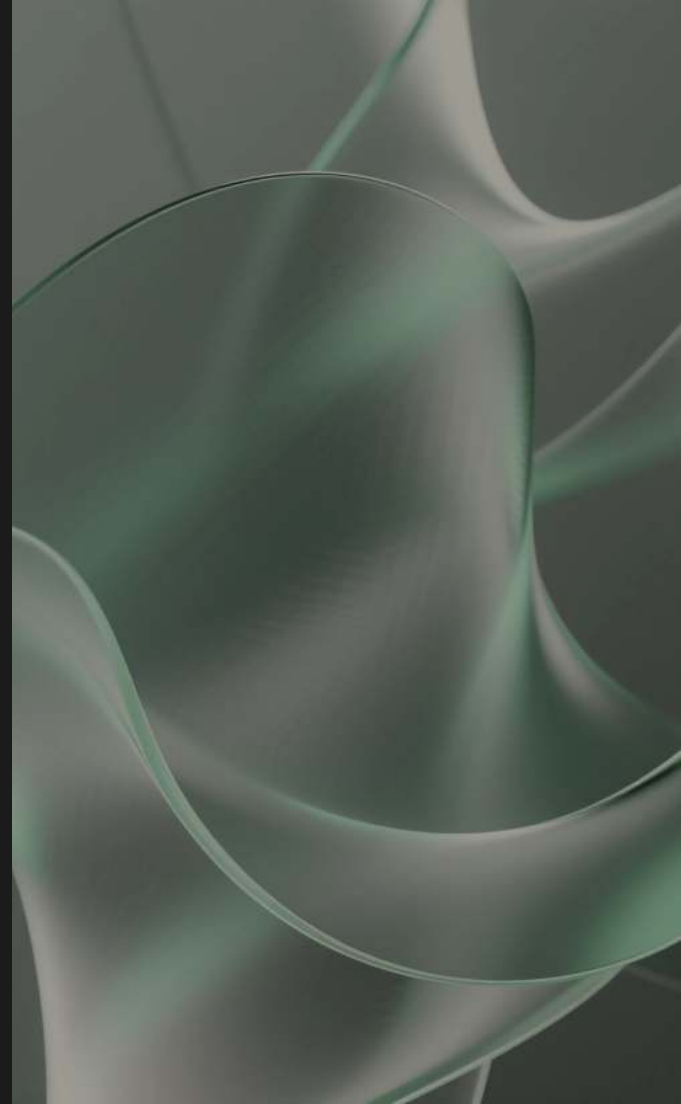
Test for stationarity using the ADF test

Apply differencing to achieve stationarity

Determine ARIMA parameters(p, d, q)

Build and evaluate ARIMA model

Generate 30-day forecast with confidence intervals



Tools & Technologies

Python

Libraries: pandas, numpy, matplotlib, seaborn, statsmodels, yfinance

IDE: VSCode

Platform: Local Machine(Windows)



Dataset Details

Ticker

AAPL (Apple Inc.)

Time Frame

Jan 2020 – Jan 2025

Frequency

Daily

Source

Extracted using yfinance API

Focus

'Close' price for forecasting





Exploratory Data Analysis

1 Trend Overview

Visualized historical 'Close' price fluctuations from 2020 to 2025.

2 Missing Values

Identified and handled missing values appropriately.

3 Seasonality Analysis

Observed no significant seasonality but noted a clear trend.

4 Modeling Preparation

Set the stage for further time series modeling.

Stationarity Check

Applied Augmented
Dickey-Fuller (ADF) Test

Initial series not
stationary (high p-
value)

Applied first-order
differencing

ADF test post-differencing → p-value
 ≈ 0.0

Data became stationary → suitable for
ARIMA





ARIMA Parameter Selection

Used ACF and PACF plots

Determined ARIMA parameters:

- $p = 1$ (based on PACF cutoff)
- $d = 1$ (after differencing)
- $q = 0$ (minimal lag in ACF)

Final Model: ARIMA(1, 1, 0)

Model chosen based on interpretability and performance

Model Fitting & Analysis

1 ARIMA Model

Trained ARIMA(1,1,0) on differenced data.

2 Residual Check

Diagnostics ensured no autocorrelation.

3 Normal Distribution

Residuals were confirmed to be normally distributed.





30-Day Price Forecast

- Forecasted next 30 days of AAPL closing prices
- Presented results with confidence intervals
- Observed slight downward trend with fluctuations
- Forecast was consistent with recent price behavior
- Suitable for short-term investment insight



Conclusion

Successfully built ARIMA(1, 1, 0) model

Forecasted AAPL stock prices with high confidence

Residuals confirmed model validity

Analysis is scalable for other stock symbols

Can be extended with SARIMA or LSTM for advanced modeling



Thank You