# Stock Market Analysis - Technical Documentation

## 1. Project Overview

This project analyzes historical stock prices of Apple (AAPL), Microsoft (MSFT), Netflix (NFLX), and Google (GOOG) over a 3-month period.

The objective is to identify trends, calculate technical indicators like moving averages and volatility, and apply a machine learning model to predict closing prices.

## 2. Data Preparation

- File Path: C:\Users\pc\Downloads\stocks.csv

- Data Cleaning: Parsed dates, renamed columns, sorted by ticker/date, and verified no missing values.

- Feature Engineering: Extracted day, month, and year from the Date column, and one-hot encoded the Ticker.

## 3. Exploratory Data Analysis (EDA)

- Visualized closing price distributions and volumes.

- Compared tickers using boxplots and scatter plots.

- Analyzed correlations among features using a heatmap.

## 4. Technical Indicators

- Calculated 10-day Moving Average (MA10) for each ticker.

- Computed 10-day Rolling Standard Deviation to measure price volatility.

## 5. Machine Learning Model

- Model Used: Linear Regression

- Features: Open, High, Low, Volume, Day, Month, Year, Ticker (one-hot encoded)

- Target: Close price

- Evaluation Metrics: RMSE and $R^2$ Score

- Plotted: Actual vs Predicted close prices.

## 6. Tools & Libraries Used

- Python

- pandas, numpy

- matplotlib, seaborn

- scikit-learn

- Jupyter Notebook / IDE

## 7. Conclusion

The analysis successfully compares the stock performance of four major tech companies, derives key financial indicators,

and builds a regression model that effectively predicts stock closing prices. The workflow is modular and can be extended for real-time stock analysis or deployment.