About:

This project consists two parts: stock price prediction and trading strategy backtesting.

1. Stock Price Prediction:
    - Incorporates feature engineering to derive meaningful indicators such as moving averages, RSI, MACD, and volatility measures.
    - Analyzes feature correlations to ensure the relevance and independence of input variables.
    - Employs a sliding window approach to create sequential data inputs, enabling the models to capture temporal dependencies in stock price movements.
    - Utilizes advanced machine learning models, including Neural Networks (NN), Recurrent Neural Networks (RNN), and Long Short-Term Memory (LSTM), to forecast stock prices.
2. Trading Strategy Backtesting:
    - Generates trading signals using the best-performing predictive model and rule-based strategies that incorporate technical indicators (e.g., moving average crossovers, volatility breakouts, and momentum thresholds) along with historical price patterns.
    - Simulates trading scenarios to evaluate strategy performance, including account value progression, total returns, and risk-adjusted metrics such as the Sharpe ratio and maximum drawdown.
    - Compares strategy performance against a buy-and-hold benchmark to assess added value.

This project provides a comprehensive framework for predicting stock prices and rigorously testing trading strategies, offering insights into the effectiveness of machine learning in financial markets.