Mean Reversion Trading Strategy - Project Report

1. Project Overview:

This project focuses on implementing a basic Mean Reversion Trading Strategy using historical price data for Microsoft Corporation (MSFT). Mean reversion strategies are based on the principle that asset prices tend to revert to their long-term mean or average over time.

2. Objective:

To develop a Python-based trading model that uses simple technical indicators to generate buy and sell signals based on price deviations from a moving average.

3. Project Workflow:

- Data Loading:
  - Uploaded and read the 'MSFT.csv' dataset containing historical stock price data.
  - Converted the 'Date' column to a datetime index for time series analysis.
- Feature Engineering:
  - Computed a 21-day Simple Moving Average (SMA) to serve as a reference mean.
  - Created 'Ratios' by dividing the closing price by the SMA.
  - Calculated Simple Returns and Log Returns to model returns behavior.
- Trading Strategy:
  - Buy when the ratio falls below the 15th percentile.
  - Sell when the ratio rises above the 85th percentile.
  - Used a forward fill technique to maintain positions.
  - Computed Strategy Returns by applying position shifts to the Log Returns.
- Performance Evaluation:
  - Plotted cumulative returns for both Buy & Hold and Mean Reversion strategies.
  - Calculated final returns for both strategies to assess performance.

4. Technologies and Libraries Used:

- pandas: Data manipulation and time series management
- numpy: Numerical calculations
- matplotlib: Data visualization

5. Key Results:

- Visual representation of Buy/Sell signals against stock price.
- Growth comparison of $1 investment under both strategies.
- Strategy Return vs Buy & Hold Return clearly highlighted.

6. Future Enhancements:

- Model transaction costs and slippage.
- Test different moving average windows dynamically.
- Expand to other stocks and asset classes for robustness testing.