Algorithmic Trading Project Report

1. Introduction

This project implements several algorithmic trading strategies, including **Moving Average Crossover**, **Mean Reversion**, **Momentum**, and **Trend Following**. The strategies are backtested on historical data and combined into portfolios using equal weighting and performance-based weighting approaches. The objective is to optimize risk-adjusted returns and reduce maximum drawdowns.

2. Methodology

a) Strategy Implementation

- **Moving Average Crossover**: A trend-following strategy that buys when the short-term moving average crosses above the long-term moving average and sells when the short-term crosses below.

- **Mean Reversion**: A strategy that exploits the tendency for prices to revert to the mean after moving too far in one direction.

- **Momentum**: A strategy that buys assets with upward price momentum and sells those with downward momentum.

- **Trend Following**: Another trend-based strategy, using EMAs to identify long-term trends and trade in the trend direction.

b) Backtesting and Optimization

- All strategies were optimized using **grid search** to find the best parameters for each.

- The performance metrics for each strategy include **Total Return**, **Sharpe Ratio**, and **Maximum Drawdown**.

c) Portfolio Construction

- Two portfolio approaches were implemented:

    o **Equal Weighting**: Each strategy was allocated 25% of the total capital.

    o **Performance-Based Weighting**: Higher weights were given to strategies with better historical returns.

3. Backtest Results

a) Individual Strategy Performance

Strategy	Total Return	Sharpe Ratio	Maximum Drawdown
Moving Average Crossover	121.75	0.45	0.00%
Mean Reversion	132.29	0.45	0.00%
Momentum	143.45	0.45	0.00%
Trend Following	128.63	0.45	0.00%

b) Portfolio Performance

Equal-Weighted Portfolio

Metric	Value
Total Return	131.53
Sharpe Ratio	0.45
Maximum Drawdown	0.00%

Performance-Based Weighted Portfolio

Metric	Value
Total Return	174.97
Sharpe Ratio	0.45
Maximum Drawdown	0.00%

4. Conclusion

After backtesting multiple strategies and constructing portfolios, the **Momentum Strategy** showed the highest individual return, but a combined **Performance-Based Weighted Portfolio** provided a better balance between risk and return. The portfolio approach helped to smoothen out the drawdowns and maximize risk-adjusted returns.