AdaBoost Classifier

1. Model Implementation

An AdaBoost classifier was implemented using 50 decision stumps (depth = 1). The model was trained on weekly features ('mean_return', 'volatility') from 2020 to 2022 and tested on 2023–2024.

2. Accuracy

The classifier achieved an accuracy of 98.10% on the test data, indicating high reliability in predicting market trends.

3. Confusion Matrix

Confusion Matrix: [[58, 1], [1, 45]]

This means the model misclassified only 2 weeks out of 105: one false positive and one false negative.

4. True Positive Rate (Sensitivity)

TPR = 97.83%. This shows the model effectively predicted most Green weeks, which are weeks when investment is recommended.

5. True Negative Rate (Specificity)

TNR = 98.31%. The model also did an excellent job recognizing Red weeks, suggesting strong overall discrimination.

6. Trading Strategy vs. Buy-and-Hold

Using the model's predictions, a weekly trading strategy was simulated:

• Final Portfolio (AdaBoost Strategy): $892.47

• Final Portfolio (Buy-and-Hold): $925.86

Although the classifier was highly accurate, its trading strategy underperformed compared to Buy-and-Hold. This could be due to short-term fluctuations or conservative exits.

7. Conclusion

AdaBoost showed strong prediction accuracy and reliability. However, trading based on its predictions did not yield better returns than a simple Buy-and-Hold approach. This highlights that classification performance doesn't always guarantee trading profitability.