SVM

1. Linear SVM Implementation

A linear SVM classifier was trained using features (mean return, volatility) from years 2020-2022, and tested on 2023-2024 data.

The linear SVM achieved an accuracy of 86.67% during the testing period, demonstrating decent predictive performance.

2. Confusion Matrix

The confusion matrix for the linear SVM during the testing period is:

[[56, 3], [11, 35]]

This indicates 56 Red weeks and 35 Green weeks were classified correctly, with minor misclassifications (3 false positives and 11 false negatives).

3. True Positive Rate and True Negative Rate

The True Positive Rate (TPR) was 76.09%, indicating that most 'Green' investment weeks were correctly identified.

The True Negative Rate (TNR) was 94.92%, suggesting excellent detection of 'Red' non-investment weeks.

4. Gaussian (RBF) SVM Accuracy

The Gaussian (RBF) SVM achieved an accuracy of 93.33% during the testing period, outperforming the linear SVM.

Thus, the Gaussian SVM was better than the linear SVM in terms of testing accuracy.

5. Polynomial SVM (Degree 2) Accuracy

The Polynomial SVM (degree 2) achieved an accuracy of 87.62% during the testing period.

It performed slightly better than the linear SVM but was not as good as the Gaussian SVM.

6. Trading Strategy vs. Buy-and-Hold

Using the labels predicted by the linear SVM model, a trading strategy was implemented for 2023-2024.

- Final portfolio value using Linear SVM strategy: $1390.12
- Final portfolio value using Buy-and-Hold strategy: $925.86

The trading strategy based on Linear SVM labels outperformed the Buy-and-Hold strategy, resulting in a significantly larger amount at the end of the testing period.