

LDA vs QDA Classification of Weekly Stock Trends

1. Objective

To evaluate the performance of Linear Discriminant Analysis (LDA) and Quadratic Discriminant Analysis (QDA) in classifying weekly stock trend labels (Green or Red) for NVIDIA stock based on mean return and volatility.

2. Data Description

The dataset includes weekly summary data from 2020 to 2024 with the following features:

- mean_return
- volatility
- Label (Green/Red)

3. Preprocessing

Labels were encoded into binary values for model training:

- Green → 1
- Red → 0

The dataset was split into:

- Training data: 2020–2022
- Testing data: 2023–2024

4. Models Trained

- Linear Discriminant Analysis (LDA)
- Quadratic Discriminant Analysis (QDA)

5. Evaluation Results

LDA Performance:

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⇒ LDA Accuracy: 86.67 %  
LDA Confusion Matrix:  
[[56  3]  
 [11 35]]
```

```
QDA Accuracy: 92.38 %  
QDA Confusion Matrix:  
[[57  2]  
 [ 6 40]]
```

- Accuracy: 86.67%
- Confusion Matrix: [[56, 3], [11, 35]]

QDA Performance:

- Accuracy: 92.38%
- Confusion Matrix: [[57, 2], [6, 40]]

6. Interpretation

- QDA outperformed LDA in both accuracy and fewer misclassifications.
- QDA better captured the nonlinear boundary between Green and Red weeks.
- LDA, being linear, misclassified more Green weeks, while QDA correctly classified more of both.

7. Conclusion

Both models were effective in classifying weekly trends, but QDA achieved superior accuracy. This suggests a nonlinear relationship between features (mean_return, volatility) and labels, making QDA a better fit for this task.

Attachments

1. Processed_Stock_Data.csv
2. Python code file (LDA_QDA Analysis)
3. This Word report