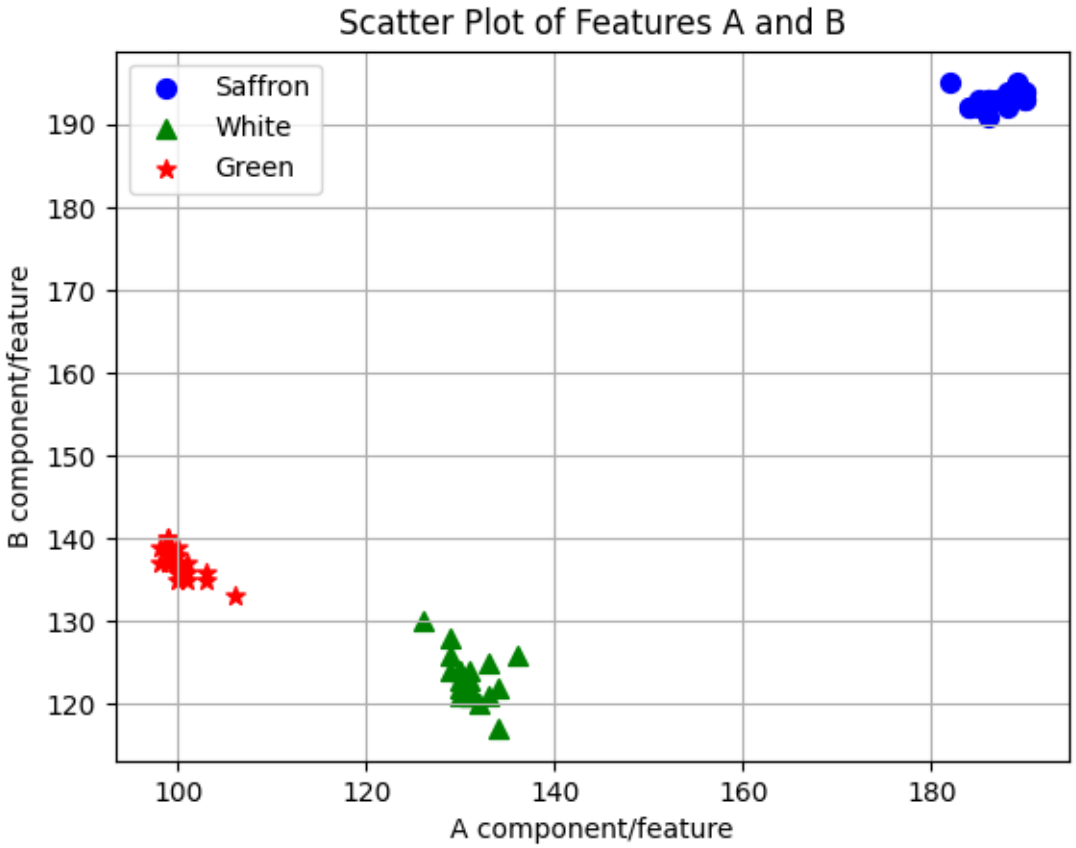
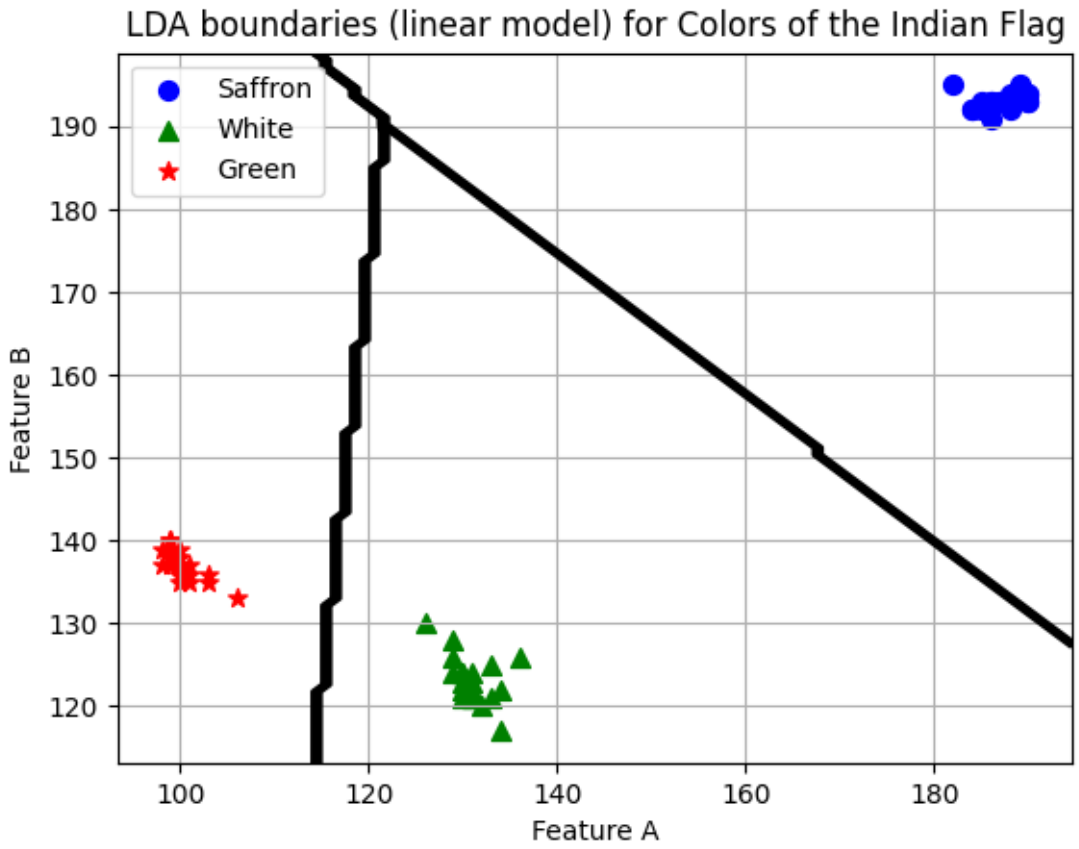
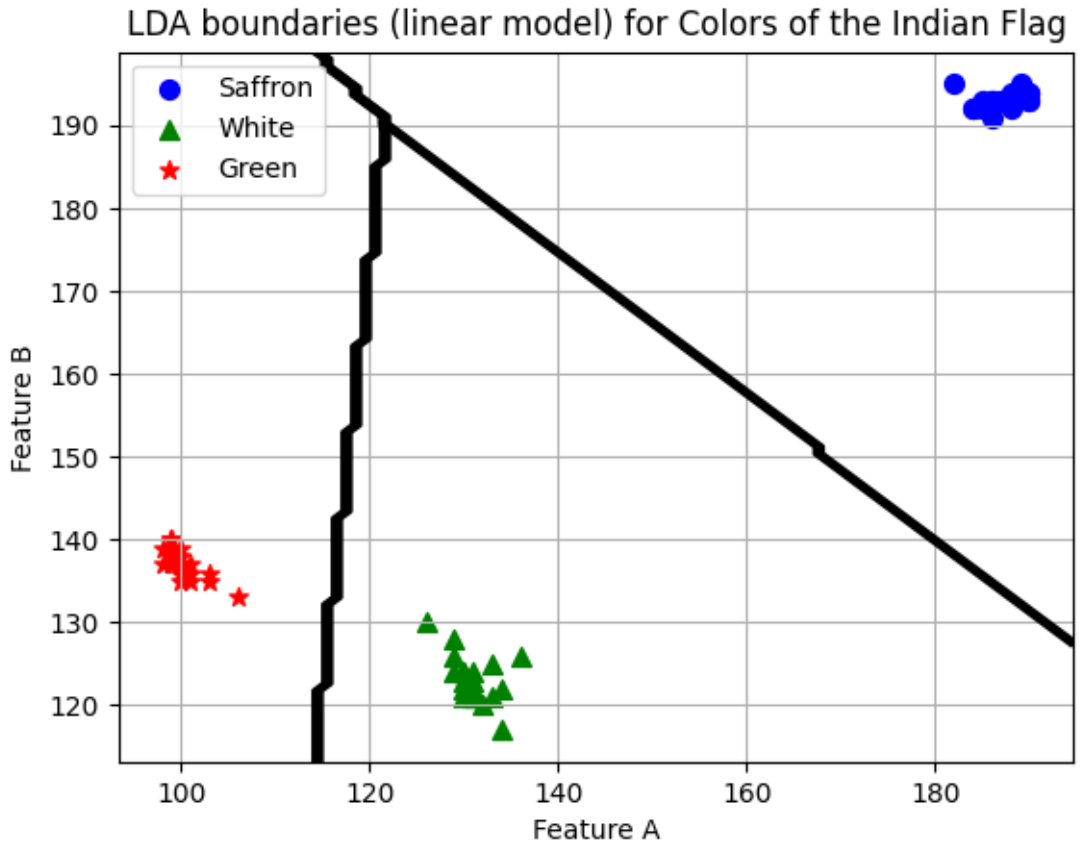
NAME:- Usman Akinyemi
ID :- U20220090




LDA boundaries (linear model) for Colors of the Indian Flag
Saffron
White
Green
Feature B
Feature A
190
180
170
160
150
140
130
120
100
120
140
160
180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1.
Key Assumptions of LDA:

1. Linear Separability: The assumption that the classes can be separated by linear boundaries.
2. Normality: The features within each class are normally distributed.

- Influence on Performance: These assumptions can influence the model's performance in various ways:

1. If the assumptions are violated, the model may not perform well.
2. Violations of the normality assumption can lead to biased parameter estimates.

2. Hyperparameters in LDA:

- The main hyperparameter in LDA is the number of components or topics to extract too few topics may lead to underfitting, while too many may lead to overfitting.

3. Assessing LDA Effectiveness:

- Topic Separation: Metrics like the silhouette score can be used to assess the separation between Classes.
- Topic Coherence: Measures like coherence score can be used to assess the interpretability of the generated classes.

4. Challenges and Limitations:

- Model Selection: Selecting the right number of topics or components can be challenging, wrong selection will lead to wrong model.
- Another limitiations is that it gives wrong answer if the class is not linearly separable but, this can be solved by using kernel functions.
- Sensitive to Assumptions: LDA's performance can be sensitive to its assumptions, such as the normality assumption.

5. Practical Applications:

- Customer Identification Select features that can specify the customers who are likely to purchase a specific product
- Disease Classification on patients' data Classifying diseases as mild, moderate, or severe using various parameters of patient health
- Bankruptcy Prediction Edward Altman's 1968 model is still a leading model to predict if a bank will go under
- Spam Detection Select the "optimal" features from hundreds of features to detect spam emails