

## Summary Report for KNN Classification on Simulated Data

### 1. Dataset Overview:

- **Data Generation:**

The dataset was generated using the `make_blobs` function with 150 samples. Three clusters were created with centers at [2, 4], [6, 6], and [1, 9], representing three distinct classes.

- **Data Splitting:**

The data was split into training and testing sets with an 80-20 ratio.

### 2. Model Details:

- **Algorithm:**

A K-Nearest Neighbors (KNN) classifier was used with its default parameters.

- **Training:**

The KNN classifier was trained on the training portion of the dataset.

### 3. Results:

- **Prediction:**

The trained KNN model was used to predict the classes of the test data.

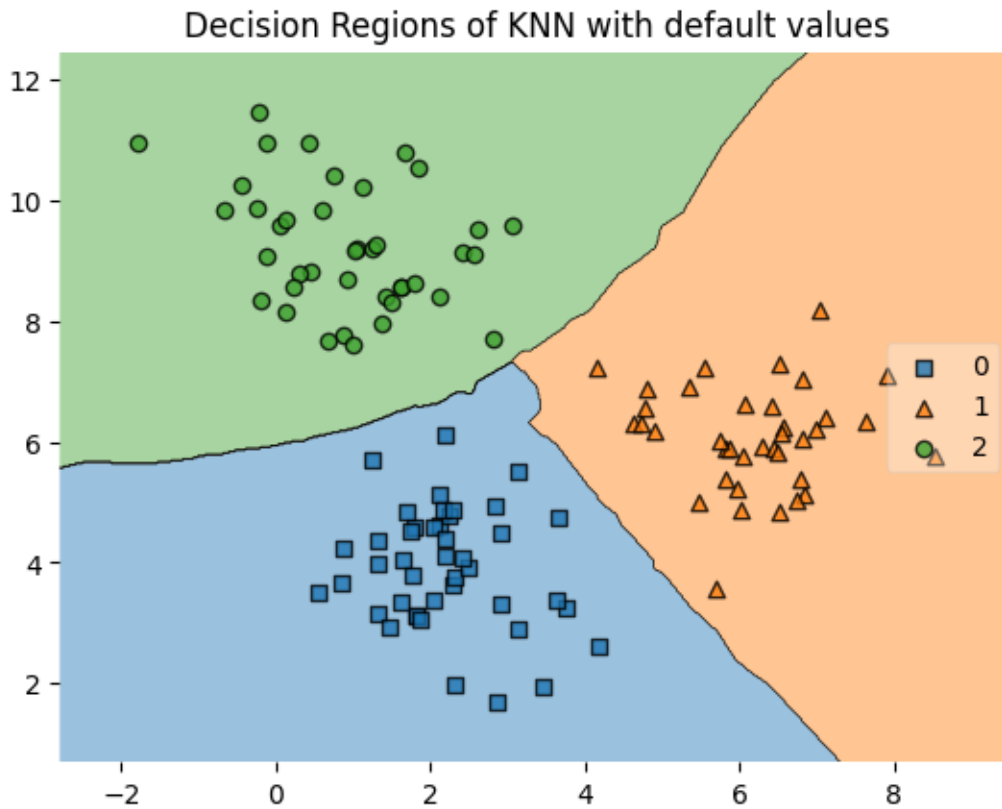
- **Accuracy Score:**

The predictions were compared to the actual test labels, resulting in an accuracy score of **100%**. This indicates that the classifier correctly predicted the class labels for all the test instances.

### 4. Visualization:

- **Decision Regions:**

The decision boundaries learned by the KNN classifier were visualized using the `plot_decision_regions` function from the `mlxtend` library. This plot provided a clear depiction of how the classifier separates the different classes in the feature space.



##### 5. Conclusion:

- The KNN classifier demonstrated perfect performance on the simulated dataset, achieving a 100% accuracy score on the test data.
- The visualization of the decision regions confirms that the classifier effectively learned the boundaries between the clusters generated by `make_blobs`.