### **Report: Comparison of Custom K-Means and Scikit-Learn K-Means Implementation**

**Objective**:  
The purpose of this experiment was to compare the results of a custom K-Means clustering implementation with the predefined K-Means algorithm from Scikit-Learn, using the Iris dataset's petal length and petal width features, and to determine the optimal number of clusters.

**Key Details**:

**Dataset**: Iris dataset (features: petal length and petal width).  
**Scaling**: Both Scikit-Learn K-Means and Custom K-Means used **MinMaxScaler** to scale features to the range [0, 1]. **Initial Number of Clusters**: 3  
**Cluster Evaluation**: Both implementations grouped the data into clusters and provided centroids.

**Results**:

* The clustering results from both implementations were **visually and numerically consistent**.
* The cluster centroids and data groupings matched closely, indicating that the custom implementation correctly replicated the behavior of Scikit-Learn's K-Means algorithm.
* The visualizations from both methods showed two distinct clusters, confirming that the optimal k is indeed 2.