Document covering the problem statement, methodology, advantages, applications, limitations/examples, working algorithm, diagram, and conclusion based on the provided code, we'll structure it as follows:

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## Problem Statement

We aim to implement the k-means clustering algorithm to partition a given set of points into two clusters.

## Packages

- `numpy` for numerical computing.

## Methodology

1. Initialize centroids.

2. Define a function to calculate Euclidean distance.

3. Perform k-means clustering iteratively:

- Assign points to clusters based on the closest centroid.

- Update centroids by calculating the mean of points in each cluster.

4. Answer specific questions based on the clustering results.

## Advantages and Applications

- \*\*Advantages\*\*:

- Simple and computationally efficient.

- Scales well to large datasets.

- Easy to interpret and implement.

- \*\*Applications\*\*:

- Customer segmentation.

- Image compression.

- Anomaly detection.

- Recommendation systems.

## Limitations/Examples

- \*\*Limitations\*\*:

- Sensitivity to initial centroids.

- Assumes spherical clusters.

- May converge to local optima.

- \*\*Examples\*\*:

- Unevenly distributed clusters.

- Non-linearly separable data.

## Working/Algorithm

1. Initialize centroids `m1` and `m2`.

2. Calculate Euclidean distance for each point from centroids.

3. Assign points to the cluster with the closest centroid.

4. Update centroids based on the mean of points in each cluster.

5. Repeat steps 2-4 until convergence or a specified number of iterations.

## Conclusion

- We successfully implemented the k-means clustering algorithm.

- It effectively clustered the given set of points into two distinct groups.

- We answered specific questions regarding cluster membership, population, and centroid updates.

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You can insert the provided code snippets within the appropriate sections of the document. Additionally, create a diagram illustrating the k-means clustering process and its results. This document provides a comprehensive overview of the implementation, along with insights into its usage and limitations.