Assignment: Application and Challenges of K-Means Clustering

Objective:
The objective of this assignment is to explore the real-world applications and challenges of the K-Means Clustering algorithm. Students will examine how K-Means can be applied to solve practical problems and evaluate its limitations in comparison to other clustering algorithms.

Instructions:

Complete the following tasks that focus on the applications and challenges of K-Means Clustering. The assignment consists of 2 parts.

Part 1: Real-World Applications of K-Means

Task 1: Select a Real-World Scenario

- Choose one real-world application where K-Means clustering can be used (e.g., customer segmentation, image compression, anomaly detection, or market segmentation).
- Provide an explanation of how K-Means clustering works in this scenario and why it is useful.

Task 2: Benefits of Using K-Means

- Discuss two main benefits of using K-Means in your chosen scenario. For example, how it improves decision-making, reduces complexity, or enhances predictions.

Expected Output:

- Around 150-200 words for Task 1 and Task 2 combined.

Part 2: Challenges and Alternatives

Task 1: Limitations of K-Means Clustering

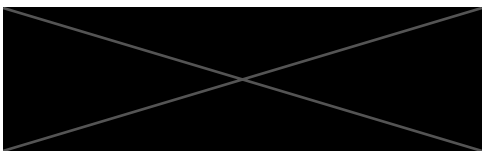
- List and explain two limitations of K-Means clustering (e.g., sensitivity to initial centroids, difficulty handling non-spherical clusters, or issues with clusters of varying sizes).

Task 2: When Not to Use K-Means

- Describe a situation where K-Means clustering is not the best choice and explain why. Suggest a more suitable algorithm for that scenario.

Expected Output:

- Around 150-200 words total for all tasks.



Deliverables:

1. **Submission Format**: PDF report with written explanations. Include code snippets and visualizations if applicable.