CSE523 - Machine Learning

Weekly Report

**Classification of Drivers based on their Driving**

**Patterns**

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Objective Overview:

This week's focus was on exploring various clustering methods, particularly diving into Kernel K-Means to better understand its advantages and operational methods.

Progress and Achievements:

Kernel K-Means Exploration:

We delved into Kernel K-Means, an extension of the traditional K-Means algorithm that operates in a high-dimensional feature space induced by a kernel function.

Advantages Discovered:

Kernel K-Means offers several advantages over standard K-Means:

Handling Non-Linearity: It can effectively handle non-linear relationships within the data, making it suitable for datasets where linear separability assumptions do not hold.

Identification of Non-Linear Features: By leveraging kernel functions like Gaussian (RBF), polynomial, or sigmoid, the algorithm can identify and exploit features that are not linearly separable in the original feature space.

Methods Explored:

We investigated the core operational methods of Kernel K-Means:

Kernel Functions: Explored common kernel functions such as Gaussian (RBF), polynomial, and sigmoid, understanding how they transform data into a higher-dimensional space where non-linear relationships can be captured more effectively.

Cluster Center Optimization: Studied how cluster centers are optimized within the kernel space, typically through techniques like gradient descent or Expectation-Maximization (EM) algorithms.

Next Steps:

Experimentation and Implementation: Plan to apply Kernel K-Means to sample datasets to evaluate its performance and compare it with other clustering techniques.

Further Research: Continue researching advanced topics related to Kernel K-Means, such as tuning hyperparameters, scalability considerations, and real-world applications.

Challenges Faced:

Understanding the mathematical intricacies behind kernel functions and their impact on clustering accuracy posed initial challenges, but these were overcome through collaborative learning and dedicated research.