CSE523 - Machine Learning

Weekly Report

**Classification of Drivers based on their Driving**

**Patterns**

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2023-2024 (Winter Semester)

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Objective Overview:

This week, our primary goal was to deepen our understanding of various clustering methods, with a specific focus on Kernel K-Means, exploring its advantages, methods, and potential applications.

Progress and Achievements:

Kernel K-Means Investigation:

Our focus was on Kernel K-Means, an extension of the traditional K-Means algorithm that operates in a higher-dimensional space induced by kernel functions.

Advantages Explored:

Kernel K-Means offers notable advantages:

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

Feature Identification: By leveraging kernel functions like Gaussian (RBF), polynomial, or sigmoid, Kernel K-Means can identify and utilize non-linear features that are not separable in the original space.

Methods Studied:

We delved into the operational methods of Kernel K-Means:

Kernel Functions: Explored common kernel functions and their impact on transforming data into a higher-dimensional space.

Cluster Center Optimization: Investigated techniques such as gradient descent or Expectation-Maximization (EM) for optimizing cluster centers in the kernel space.

Next Steps:

Practical Application: Plan to implement Kernel K-Means on sample datasets to evaluate its effectiveness and compare it against other clustering techniques.

Advanced Research: Further explore advanced concepts related to Kernel K-Means, including parameter tuning, scalability considerations, and real-world use cases.

Challenges Encountered:

Understanding the mathematical underpinnings of kernel functions and their application in clustering posed initial challenges. However, through collaborative learning and focused research, we gained a clearer grasp of these concepts.

Conclusion:

Exploring Kernel K-Means and its advantages has expanded our knowledge of clustering methodologies, paving the way for more sophisticated data analysis techniques. We are excited to apply these insights in practical scenarios and deepen our expertise in clustering algorithms.