Ahmedabad University

CSE523 : Machine Learning

Section No.: 1, Group No.: 5

"Identifying hard stop & momentary stop detection"

Weekly Report-3

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Weekly Report: Week 3

Summary:

During Week 3, our team focused on data preprocessing, feature extraction, and initial data analysis for the stop detection project. We delved into preparing the datasets, extracting relevant features, and conducting an initial analysis to gain insights into the trajectory data.

Data Preprocessing:

1. **Data Cleaning**:
    - Conducted data cleaning procedures to handle missing values, outliers, and inconsistencies in the trajectory datasets.
    - Standardized the data format and resolved any formatting issues to ensure uniformity across the datasets.
2. **Normalization**:
    - Applied normalization techniques to scale the numerical features within a consistent range, facilitating accurate model training.

Feature Extraction:

1. **Feature Selection**:
    - Identified and extracted key features such as POI types, road network characteristics, temporal attributes, and environmental contexts from the trajectory data.
    - Utilized the Mobility Context Cube (MCC) model to capture dynamic spatiotemporal features surrounding stop points.

Data Analysis:

1. **Exploratory Data Analysis (EDA)**:
    - Conducted EDA to understand the distribution of features, correlations between variables, and patterns within the trajectory data.
    - Visualized the spatial and temporal characteristics of stop points to uncover insights that could aid in stop detection.
2. **Feature Importance Analysis**:
    - Analyzed the importance of extracted features in distinguishing stop behaviors and their impact on the accuracy of stop identification.
    - Evaluated the discriminatory power of each feature through statistical analysis and visualization techniques.

Insights Gained:

1. **Data Patterns**:
    - Identified spatial and temporal patterns in the trajectory data that could influence stop behaviors and the surrounding environmental contexts.
    - Recognized the significance of certain features in differentiating between stop points and movement segments.

Next Steps:

1. **Model Training**:
    - Proceed with training the SVM classifier using the preprocessed datasets and extracted features to build the stop detection model.
    - Fine-tune the model parameters based on the insights gained from data analysis to enhance performance.

2. **Validation and Evaluation**:
    - Develop a validation strategy to assess the model's performance using metrics such as accuracy, precision, recall, and F1-score.
    - Validate the model against test datasets to ensure its robustness and generalization capabilities.

References to Credible Research Papers:

1. Gong L. et al. (Year). Title of the Paper. Journal/Conference.
2. Author, A., Author, B. (Year). Title of the Paper. Journal/Conference.

This Week 3 report highlights the progress made in data preprocessing, feature extraction, and data analysis for the stop detection project. The insights gained from the initial analysis will inform the subsequent stages of model training, validation, and evaluation.

Github Repository Link:

Hard-Stop-and-Momentary-Stop-Detection-System