



**Ahmedabad
University**

CSE523 : Machine Learning

Section No.: 1, Group No.: 5

“Identifying hard stop & momentary stop detection”

Weekly Report-4

Submitted to: *Prof. Mehul Raval*

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Data & Feature Extraction:

The study focuses on analyzing vehicle trajectories at signalized junctions, distinguishing between "Momentary" and "Hard" stop conditions. Data preprocessing involves handling missing values and ensuring data completeness. Feature extraction techniques calculate Euclidean distances, derive velocity and acceleration attributes, and capture spatial-temporal dynamics. Stop patterns are identified based on specific criteria for differentiating between hard stops and momentary stops.

Random Forest Implementation:

The Random Forest algorithm is utilized to classify stop patterns. The dataset is divided into training and testing sets, with missing values imputed using the mean of each feature. The Random Forest classifier is trained on the imputed data to predict and classify hard stops and momentary stops. To assess predictive capabilities, model performance is evaluated using accuracy metrics, confusion matrices, and classification reports.

Performance & Accuracy Analysis:

The evaluation of the Random Forest classifier showcases promising results, with precision, recall, and F1-score metrics indicating the model's proficiency in distinguishing between stop types. The support analysis provides insights into the distribution of stop instances, while the overall accuracy of 73% underscores the model's effectiveness in classifying stop patterns. Visualization aids, like scatter plots, enhance the interpretation of classification results.

Results:

The Random Forest classifier demonstrates accuracy in classifying stop events, with precision values of 0.72 for the "Hard" class and 0.74 for the "Momentary" class. Recall values of 0.72 for the "Hard" class and 0.74 for the "Momentary" class indicate the model's ability to capture

positive instances effectively. The F1-scores of 0.72 for the "Hard" class and 0.74 for the "Momentary" class provide a balanced metric combining precision and recall.

	Precision	Recall	F1-score	Support
FALSE	0.72	0.74	0.72	9062
TRUE	0.74	0.74	0.74	9813
accuracy	0.73	0.73	0.73	18875
macro avg	0.73	0.73	0.73	18875
weighted avg	0.73	0.73	0.73	18875

Future Plans:

Future goals include enhancing the algorithm's capabilities by incorporating advanced approaches for recognizing moving vehicles. Improving feature engineering techniques and exploring data augmentation methods aim to increase model accuracy in discriminating between different stop types. Refining model interpretability and assessing implications for traffic management and urban planning initiatives are crucial for real-world applicability.

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.

Github Repository Link:

[Hard-Stop-and-Momentary-Stop-Detection-System](#)