

# Road Accident Analysis And Traffic Severity Prediction Using Advanced Data Mining Techniques

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## PROBLEM STATEMENT

The escalating number of road accidents, resulting in significant loss of life, injury, and economic burden, necessitates the development of advanced analysis techniques to identify underlying factors, inform evidence-based interventions, and improve transportation safety. Traditional methods of road accident analysis often lack accuracy, interpretability, and the ability to handle complex data, highlighting the need to explore innovative data mining approaches for enhanced road accident analysis, pattern recognition, and predictive modeling.

## METHODS

This research employed a comprehensive data mining approach to analyze road accident data and derive insights for improving transportation safety. The methodology involved data collection from reliable sources, including accident reports and transportation authorities. Preprocessing techniques were applied to ensure data quality, such as handling missing values and removing outliers. Exploratory data analysis was conducted using visualizations to identify patterns and trends. Suitable data mining algorithms, including k-means clustering, association rule mining, Support Vector Machines, and Self-Organizing Maps, were selected based on the problem statement and data characteristics. The models were trained on preprocessed data, and their performance was evaluated using metrics like accuracy and F1-score. The trained models were then interpreted to extract valuable insights, patterns, and predictions related to road accidents, informing evidence-based interventions.

## RESULTS

The application of data mining techniques to road accident data revealed crucial insights. High-risk accident clusters were identified using k-means clustering, while association rule mining uncovered common accident patterns and risk factors. Support Vector Machines accurately predicted accident severity levels, aiding in proactive measures. Self-Organizing Maps visualized accident trends, enhancing understanding. These findings showcase the effectiveness of data mining in predicting causes, identifying patterns, and guiding interventions for improved transportation safety. Policymakers and safety organizations can utilize these insights to develop evidence-based strategies for reducing road accidents and their severity.

## SIGNIFICANCE

This research project is crucial for addressing road accidents' impact on public safety. By utilizing data mining techniques, it offers data-driven insights to inform interventions effectively. The identification of high-risk accident clusters, patterns, and severity predictions enables targeted measures to reduce risks. These findings guide policymakers, transportation authorities, and safety organizations in developing evidence-based strategies to enhance road safety, potentially saving lives and minimizing economic

losses. The successful application of data mining showcases the potential for informed decision-making in improving transportation safety and community well-being.