Chapter 11
Financing AI-Based Safety Features in Autonomous Vehicle Development

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ABSTRACT

This work investigates how AI safety techniques activated in an AV environment influence the creation of safe AVs and whether machine learning approaches can enhance the functioning of these safety features. The focuses on three key techniques: The methodology used in this is as follows; outlier detection for data preprocessing, Recursive Feature Elimination (RFE) for feature selection, and Convolutional Neural Networks (CNNs) for the classification. Cleaning activity is carried out using outlier detection, which helps to scrub the sensor data of any anomalies to feed the other steps appropriately. Cross as defined in cross-validation is used to implement RFE thereby achieving feature elimination which leads to enhancement of efficiency and reduction in complexity of the models. CNNs are subsequently used to extract and categorize visual information captured by the cameras and other sensors to improve the AV's capability to make real-time safety decisions. The current emphasizes the benefits of safe AV navigation as well as risk minimization and financing decision-making.

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I. INTRODUCTION

Self-driving cars, also known as autonomous vehicles (AVs), are, inarguably one of the groundbreaking technologies of the 21st century. When going from concept cars to serial production the integration of sophisticated safety systems with the aid of AI (Pandey, B. K., & Pandey, D., 2025) takes center stage. Safety features that are implemented by AI seek to bring about additional decision-making authority to the car in real-time thereby minimizing on occurrence of` accidents and promoting safer road use. However, the integration of AI in the design of AVs has numerous difficulties concerning data processing, feature selection, and reliable decision-making. The concern of this research paper is on the financial and operational aspects of AI-based safety features; on the techniques used to preprocess the data collection; and on how optimization (Khadka, M. et al., 2025). of the resulting classifiers that govern the AI safety features systems (Sheela, M. S. et al., 2025).

In fully automating the car, information gathered by cameras, LiDARs, and radar is crucial for the system in real-time decision-making. However, data from sensors are inherently noisy and iterative, and any such data would negatively impact AI models. To that end, the preprocessing step namely outlier detection assumes a crucial responsibility (Kumar, M. S. et al., 2025). Data cleaning methods remove cases that lie outside the normal distribution and which may have a significant impact on the model (Satheesh, N. et al., 2025). The following are benefits of outlier detection in training an AI system and self-driving cars in particular: Outlier detection improves reliability since the AI (Konapure, C. G. et al., 2025) is trained using only valid data that minimizes the chances of the car performing unconsciously with variability in the driving area.