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Adaptive AI Models for Safe and Efficient Lane Change in Autonomous Driving

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Abstract

Connected Automated Vehicles (CAVs) have the potential to enhance safety and mobility by reducing the number of crashes on the road and improving real-time traffic flow. CAV technologies enable vehicles to communicate and exchange information with other vehicles, pedestrians, and roadway infrastructure using Vehicle-to-Everything (V2X) communication. Various data processing methods leverage sensor-generated data to enhance decision-making. With advancements in Artificial Intelligence (AI), research increasingly indicates that AI can play a crucial role in optimizing decision-making within CAV networks. This study analyzes and categorizes a specific technique known as the Recurrent Neural Network (RNN), which is designed for sequential data processing by maintaining a memory of previous inputs. An RNN-based model is developed to predict lane changes that are both safe and efficient in a highway environment. This model is trained and evaluated using real-world highway driving datasets, ensuring reliable predictions. The findings will offer insights into the effectiveness of lane-change prediction across different traffic applications and scenarios. This research aims to improve CAV systems, promoting safer and more efficient intelligent transportation networks while also paving the way for further studies on decision-making in CAV networks. The results are expected to offer valuable insights that drive advancements in intelligent transportation technologies, paving the way for improved traffic management and roadway safety.

Keywords
Intelligent transportation system, Connected vehicles, artificial intelligence, neural networks, and safety.

Biographies

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