

Advancements in Machine Learning Techniques for Traffic Flow Prediction in Autonomous Vehicles: A Comprehensive Review

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Abstract: *Traffic flow prediction is a critical aspect of enabling the successful deployment of autonomous vehicles (AVs) in urban environments. Accurate and reliable traffic flow prediction plays a crucial role in allowing AVs to navigate efficiently and make informed decisions. Machine learning techniques have emerged as powerful tools for traffic flow prediction, leveraging large-scale datasets and complex models to capture the inherent dynamics of traffic patterns. This comprehensive review examines the state-of-the-art machine learning techniques used for traffic flow prediction in AVs, highlighting their strengths, limitations, and future research directions. The review also explores data sources and preprocessing techniques, performance evaluation metrics, case studies, and real-world applications. Furthermore, it discusses the challenges associated with traffic flow prediction for AVs, such as data scarcity and model interpretability, and identifies promising future research directions, including reinforcement learning and multimodal fusion. This review serves as a valuable resource for researchers, practitioners, and policymakers interested in advancing traffic flow prediction for autonomous vehicles.*

Keywords: Traffic flow prediction, Autonomous vehicles, Machine learning techniques, Advancements, Comprehensive review

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