Enhancing Autonomous Vehicle Navigation Using Deep Reinforcement Learning

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Abstract. This article delves into the utilization of deep reinforcement learning to improve autonomous vehicle navigation. We explore the integration of advanced neural networks to enhance decision-making processes in real-time traffic scenarios. The proposed method significantly reduces the computational cost while maintaining high accuracy levels. Results from simulation tests demonstrate superior performance over traditional methods, particularly in dynamic environments with unpredictable obstacles. This study provides a foundational understanding for implementing AI-driven navigation systems in future autonomous vehicles, ensuring safer and more efficient transportation solutions.

Keywords: Autonomous Vehicles, Deep Reinforcement Learning, Neural Networks, Obstacle Avoidance, Traffic Navigation

Introduction

The rapid advancement of artificial intelligence has opened new avenues for enhancing autonomous vehicle technology. Among the myriad of AI techniques, deep reinforcement learning stands out due to its ability to learn complex behaviors in uncertain environments. This research investigates the application of deep reinforcement learning algorithms to improve autonomous vehicle navigation, focusing on path optimization and obstacle avoidance. By leveraging convolutional neural networks, the system can process real-time data and adapt to changing traffic conditions effectively. Preliminary results indicate a marked improvement in navigation efficiency compared to traditional rule-based systems.

References

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