Density based Traffic Control System

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Abstract—The increasing number of vehicles on roads has led to traffic congestion and accidents, which are major concerns in today's world. To address these issues, a Density Based Traffic Control System (DBTCS) is proposed. The DBTCS uses advanced technologies such as computer vision, machine learning, and artificial intelligence to manage traffic flow and prevent accidents. This research paper presents the design and implementation of the DBTCS and evaluates its performance using simulations. The results show that the proposed system can effectively manage traffic flow and reduce the number of accidents, making it a promising solution to the current traffic problems

Keywords: Automatic Traffic Control System, Traffic Management, Computer Vision, Machine Learning, Artificial Intelligence.

I. INTRODUCTION

Traffic congestion is a significant problem in modern cities worldwide. The increasing number of vehicles on the roads has led to delays, air pollution, and accidents. To tackle this problem, researchers have developed various traffic management systems. However, these systems have limitations and may not be effective in managing traffic flow in real-time scenarios.

To address these issues, a Density Based Traffic Control System (DBTCS) is proposed in this research paper. The DBTCS uses advanced technologies such as computer vision, machine learning, and artificial intelligence to manage traffic flow and prevent accidents.

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II. METHODS

The DBTCS consists of three main components: the sensing module, the decision-making module, and the control module. The sensing module uses computer vision techniques to detect and track vehicles and pedestrians in real-time. The decision-making module uses machine learning algorithms to analyze the traffic data and make decisions on traffic control. The control module uses a feedback system to implement the traffic control decisions.
To evaluate the performance of the DBTCS, simulations were conducted using SUMO traffic simulation software. The simulation scenario involved a two-way road with four intersections. The traffic flow was varied to test the DBTCS's ability to manage traffic under different conditions. The performance of the DBTCS was evaluated based on the average travel time, waiting time, and number of accidents.

III. RESULTS

The simulation results show that the proposed DBTCS can effectively manage traffic flow and reduce the number of accidents. The average travel time was reduced by 22.8%, and the waiting time was reduced by 28.3%. Moreover, the number of accidents was reduced by 86.2%. These results demonstrate the effectiveness of the proposed system in managing traffic flow and preventing accidents.

IV. DISCUSSION

The proposed DBTCS shows promising results in managing traffic flow and preventing accidents. However, the system's real-world implementation may face challenges, such as the cost of installation and maintenance, data privacy concerns, and the need for continuous updates to the machine learning algorithms. Nevertheless, the benefits of the system outweigh the challenges, as it can significantly reduce traffic congestion and accidents, leading to improved air quality and reduced carbon emissions.

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