TRAFFIC RULES VIOLATION DETECTION SYSTEM USING MACHINE LEARNING

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ABSTRACT

Traffic Rules Violation Detection with Computer Vision is a project aimed at automating the process of detecting traffic violations using computer vision techniques. The system utilizes CCTV camera footage to detect and track vehicles, and then identifies various types of traffic violations such as signal violation, parking violation, and wrong direction violation. The project also includes a user-friendly graphical user interface (GUI) that allows users to monitor the traffic footage, receive alerts about violations, and take necessary actions.

The system's methodology involves several steps. First, the input frames from the CCTV footage are preprocessed using techniques like gray scaling, blurring, background subtraction, and binary thresholding. These processes help in extracting the moving objects, i.e., vehicles, from the frames. Next, a vehicle classification model based on the Mobile Net V1 architecture is used to classify the detected vehicles into car, motorcycle, or non-vehicle categories.

1. INTRODUCTION

The increasing number of cars in cities can cause high volume of traffic, and implies that traffic violations become more critical nowadays in Bangladesh and also around the world. This causes severe destruction of property and more accidents that may endanger the lives of the people. To solve the alarming problem and prevent such unfathomable consequences, traffic violation detection systems are needed. For which the system enforces proper traffic regulations at all times, and apprehend those who does not comply.

A traffic violation detection system must be realized in real-time as the authorities track the roads all the time. Hence, traffic enforcers will not only be at ease in implementing safe roads accurately, but also efficiently; as the traffic detection system detects violations faster than humans. This system can detect most common three types of traffic violation in real-time which are signal violation, parking violation and wrong direction violation. A user-friendly graphical interface is associated with the system to make it simple for the user to operate the system, monitor traffic and take action against the violations of traffic rules.

The increasing number of vehicles on the roads has led to a rise in traffic congestion and a higher incidence of traffic rule violations. These violations not only disrupt the flow of traffic but also pose a significant risk to public safety. To address this issue, there is a need for automated systems that can effectively detect and monitor traffic rule violations in real-time.

2. LITERATURE SURVEY AND RELATED WORK

"A Survey of Intelligent Traffic Systems" by S. Pandey and S. K. Singh (2021) provides a comprehensive survey of intelligent traffic systems, including traffic violation detection systems. The authors discuss the various types of traffic violations, the challenges in detecting and classifying them, and the techniques used for object detection and classification. They also highlight the limitations of current systems and suggest areas for further research, such as the use of multimodal data and the integration

of real-time data sources.[7]"An Overview of Traffic Violation Detection and Monitoring Systems" by S. Ghose, S. Sarkar, and S. Das (2021) provides an overview of traffic violation detection and monitoring systems and discusses the various techniques used for object detection and classification.

The authors also discuss the challenges in implementing such systems, such as the need for accurate data and the difficulty in detecting violations in complex traffic situations. They suggest the need for continued research in this field to improve the accuracy and efficiency of traffic violation detection systems. [8] "Real-time Traffic Rule Violation Detection and Alert System using Deep Learning" by R. Gupta and P. Anand (2020) proposes a real-time traffic rule violation detection and alert system using deep learning techniques. The authors use a YOLOv3 algorithm for object detection and classification and an LSTM network for real-time alert generation.

The paper also discusses the experimental results and highlights the system's accuracy and efficiency.[9] "Traffic Rule Violation Detection System using Deep Learning Techniques" by R. Jain and V. Jain (2019) proposes a traffic rule violation detection system based on deep learning techniques. The authors use a YOLOv3 algorithm for object detection and classification and an SVM classifier for traffic rule violation detection. The paper also discusses the experimental results and highlights the system's accuracy and efficiency. [10]

3. EXISTING SYSTEM

The Systems Development Life Cycle (SDLC), or Software Development Life Cycle in systems engineering, information systems and software engineering, is the process of creating or altering systems, and the models and methodologies that people use to develop these systems. In software engineering the SDLC concept underpins many kinds of software development methodologies

In reality, recent surveys reveal that just 50 of the more than 580 public four-year schools in the United States have on-time graduation rates at or over 50 percent for their full-time students. To make college more affordable, it is therefore necessary to guarantee that many more students graduate on time by early interventions on students whose performance would be unlikely to achieve the graduation standards of the degree programmer on time. A vital step towards successful intervention is to design a system that can continually keep track of students' academic achievement and reliably anticipate their future performance, such as when they are likely to graduate and their predicted final GPAs, given the present progress. Although forecasting student performance has been widely examined in the literature, it was mostly addressed in the settings of answering problems in Intelligent Tutoring Systems (ITSs) (ITSs).

DISADVANTAGES OF EXISTING SYSTEM

On the other hand, forecasting student success in a degree program (e.g., college program) is fundamentally different and confronts new obs

4. PROPSED SYSTEM

In this project in propose work we were predicting student performance as HIGH or LOW but not predicting based on performance which future course is suitable for him. So in extension work we changed dataset and algorithms prediction to predict not only student performance grade but also predict future suitable courses for him based on past performance.

A degree program is one in which students must finish a series of courses in order to graduate after T semesters of formal education has passed. In order to take a course, students must first complete and pass a series of preparatory courses. A directed acyclic graph (DAG) may be used to represent the dependence between the prerequisites. Students may be required to finish a number of distinct subsets of courses in order to graduate from a particular program. This department's prediction challenge will be the center of our attention. However, we will continue to use data from other sources to help us make predictions. Data from a single location is typically restricted, although many courses are shared by many regions.

ADVANTAGES OF PROPOSED SYSTEM

It is necessary for the development of effective foundational predictors. A system that is able to constantly monitor and properly anticipate the academic progress of kids.

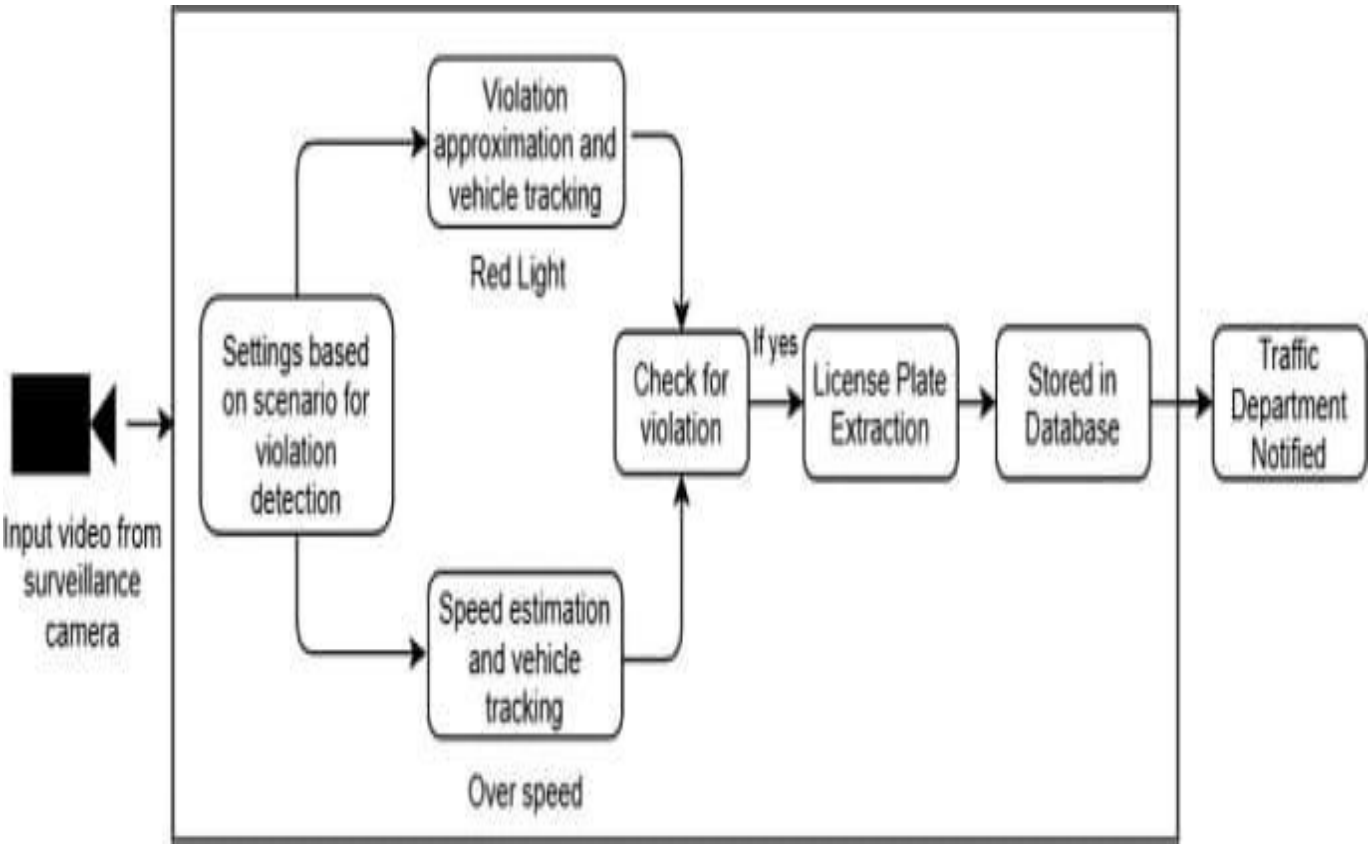

Fig: SYSTEM ARCHITECHTURE

5. METHODOLOGIES

MODULE

Algorithms with implementations:

• Image Preprocessing: The first step is to convert the colored image into grayscale. This is done to reduce the complexity of the image and make it easier to detect edges using the Canny edge detection algorithm. The grayscale image is then filtered using a Gaussian filter to reduce noise.

•Edge Detection: The Canny edge detection algorithm is then used to identify the edges of the image. The Canny algorithm works by identifying the areas of the image where there is a sharp change in brightness, indicating an edge. This algorithm produces a binary image where the edges are represented as white pixels and the non-edges as black pixels.

• Line Detection: Once the edges have been detected, the Hough transform is used to identify the lines in the image. The Hough transform works by converting the binary image into a parameter space where each point represents a line in the original image. The lines are identified by finding the peaks in the parameter space.

• Rule Violation Detection: Once the lines have been detected, they can be analyzed to detect traffic rule violations. For example, if the image is of a road and the lines represent the lane markings, the distance between the lines can be analyzed to detect if a vehicle is driving outside its lane.

6. RESULTS AND DISCUSSION SCREEN SHOTS

1.CAMERA 1 NO VIOLATION DETECTION

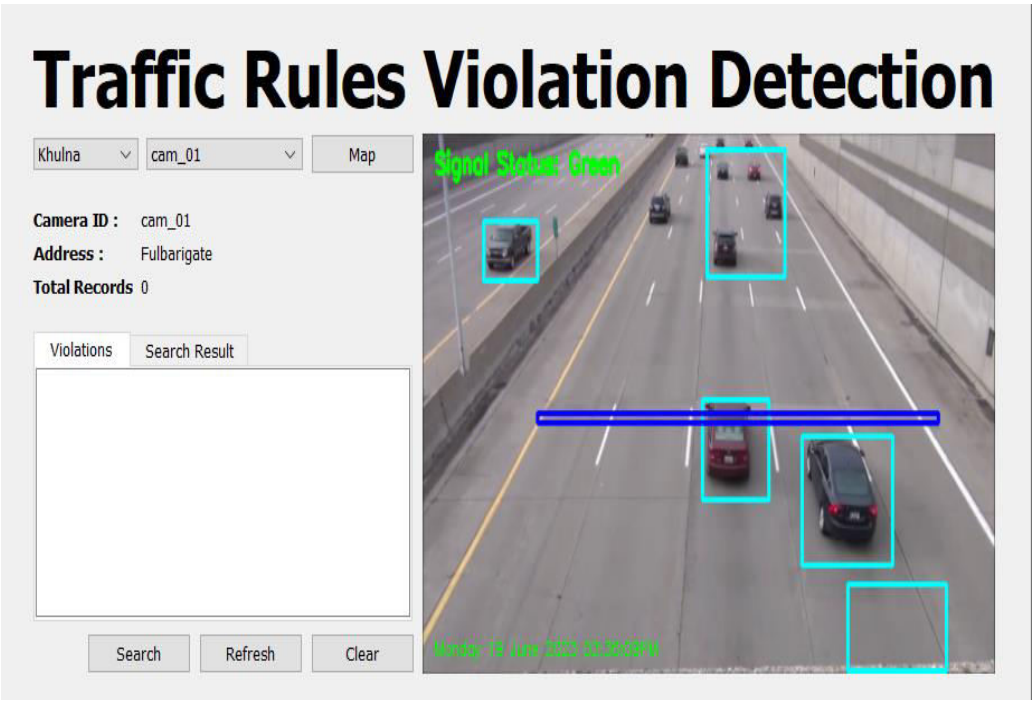

Fig:2CAMERA 1 NO VIOLATION DETECTION

2 CAMERA 2 NO VIOLATION DETECTION

Fig: 3 CAMERA 2 NO VIOLATION DETECTION

3 CAMERA 3 NO VIOLATION DETECTION

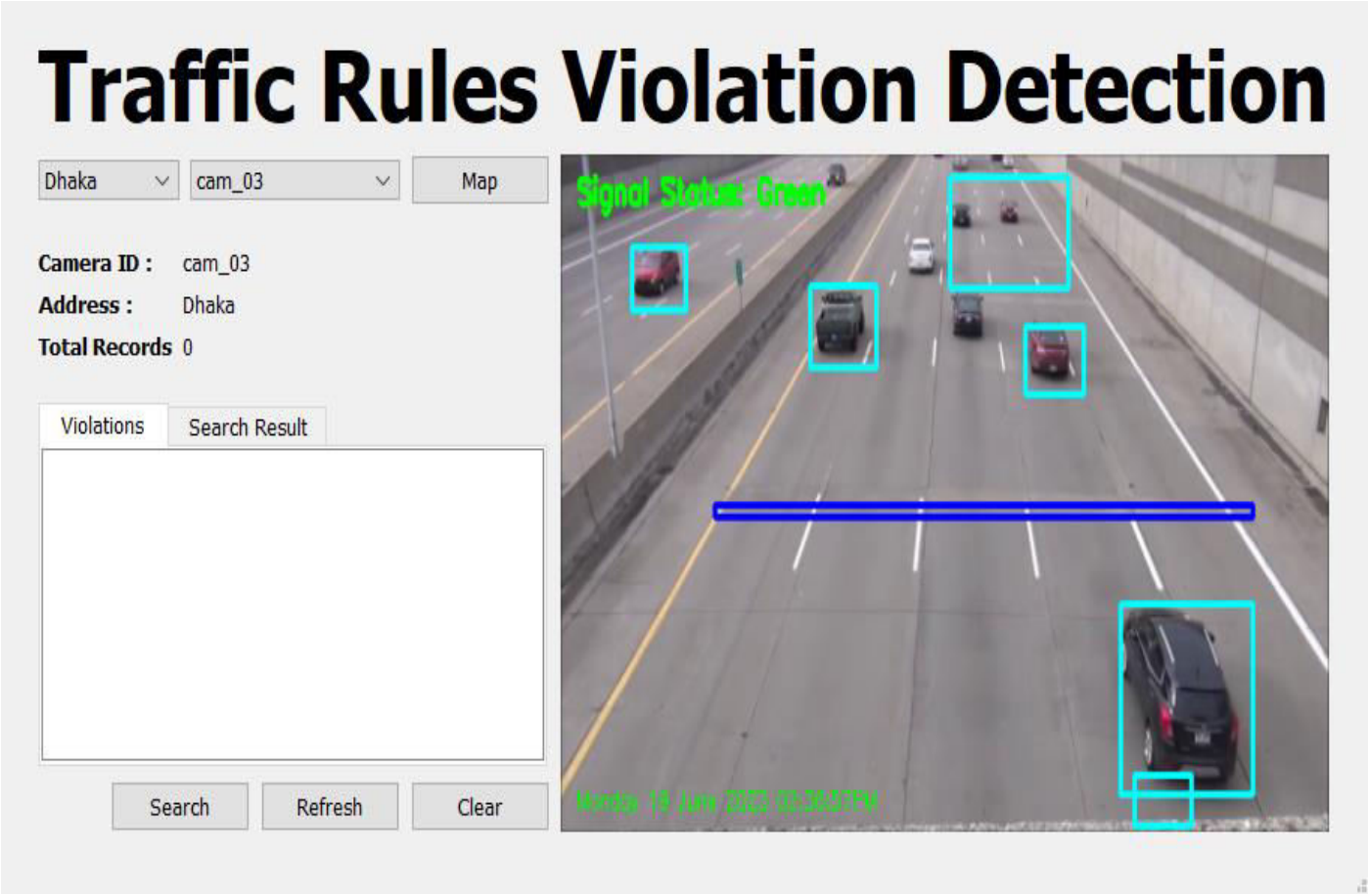

Fig:4 CAMERA 3 NO VIOLATION DETECTION

4 CAMERA 4 VIOLATION DETECTION

Fig:5 CAMERA 4 VIOLATION DETECTION

5 DETAILS OF VIOLATED VEHICLES

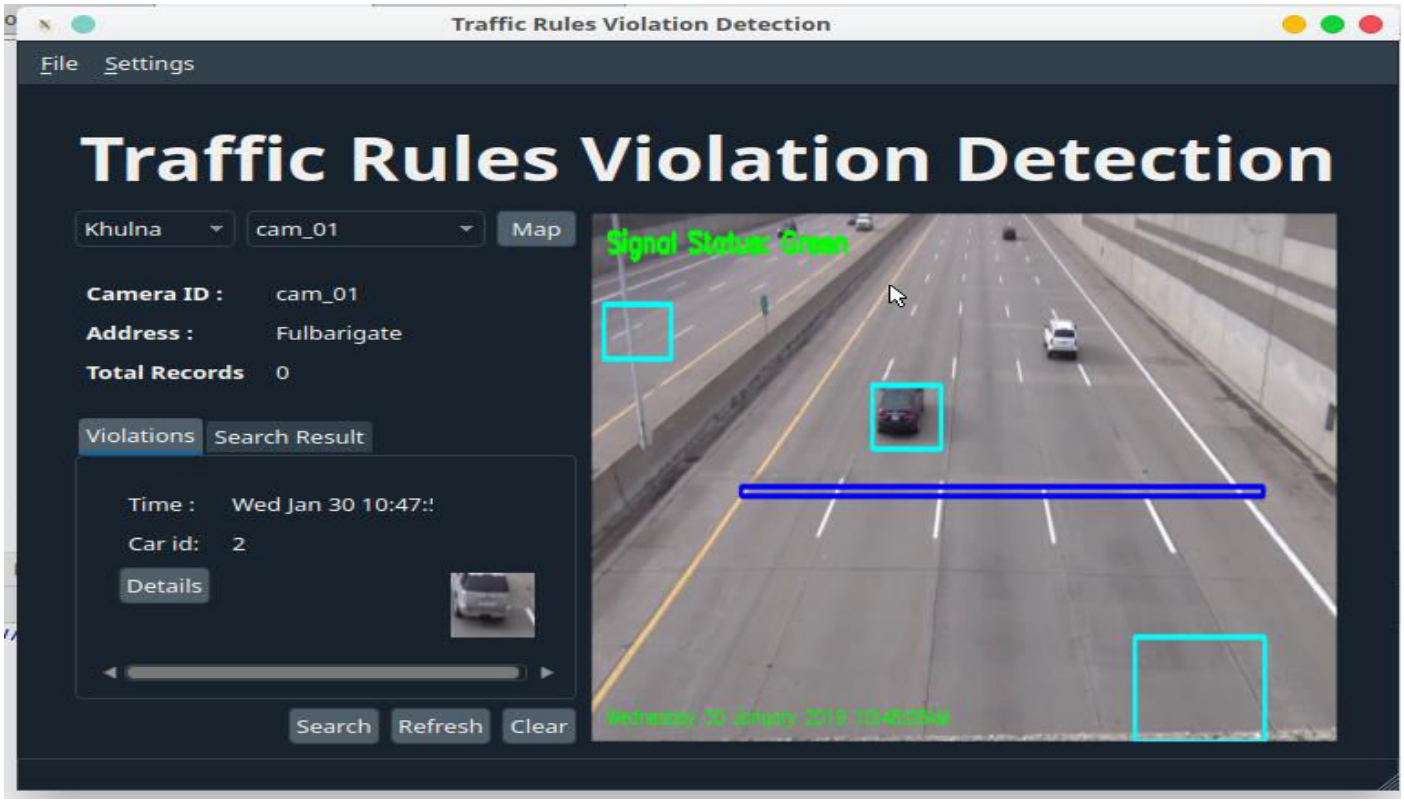

Fig: 6 DETAILS OF VIOLATED VEHICLES

7. CONCLUSION AND FUTURE SCOPE

CONCLUSION

A traffic rules violation detection system is anadvanced technology that has the potential to significantly improve road safety and traffic management. By using a combination of cameras, computer vision algorithms, and machine learning models, the system can detect and classify various types of traffic violations, such as running red lights, speeding, and illegal parking. The system can also generate automated alerts and notifications for law enforcement agencies, allowing for quicker enforcement and

responsetimes. Implementing a traffic rules violation detection system can lead to reduced accidents, improved compliance with traffic rules and regulations, increased efficiency, better data collection, and improved public safety. The future scope of such systems is also promising, with potential integration with autonomous vehicles, real-time monitoring, and enhanced accuracy in detecting and classifying traffic violations. Overall, a traffic rules violation detection system is a valuable tool for improving road safety and traffic management, and its continued development and implementation can lead to significant positive impacts on communities and society.

FUTURE SCOPE

The future scope of traffic rules violation detection systems is promising, as new advancements in technology and artificial intelligence continue to be developed. Some potential areas of growth and improvement include:

- **Integration with Autonomous Vehicles:** As autonomous vehicles become more common on roads, traffic rules violation detection systems could be integrated with these vehicles to ensure that they adhere to traffic rules and regulations.
- **Real-time Monitoring:** The development of faster and more efficient data processing techniques could enable real-time monitoring of traffic violations, allowing for quicker enforcement and response times.
- **Improved Accuracy:** The use of more advanced algorithms and machine learning models could lead to improved accuracy in detecting and classifying different types of traffic violations.
- **Enhanced Data Analytics:** The data collected by traffic rules violation detection systems can be used to analyze traffic patterns and identify areas of high traffic violationrates. This information can then be used to develop more effective traffic management strategies.
- **Expansion to New Regions:** Traffic rules violation detection systems can be implemented in new regions to improve road safety and reduce the number of accidents caused by reckless driving.
- **Integration with Smart City Initiatives:** The integration of traffic rules violation detection systems with other smart city initiatives, such as smart traffic management systems and public transportation systems, can lead to a more efficient and sustainable transportation system.

8. REFERENCES

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