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TRAFFIC RULES VIOLATION DETECTION SYSTEM USING MACHINE LEARNING

Mrs. P. Sri Jyothi, Assistant Professor, Department of Information Technology, Vignan's Institute of Information Technology(A), Visakhapatnam-530049
Mr. Padmanabhuni Vamsi, MCA Student, Department of Master of Computer Application, Vignan's Institute of Information Technology(A), Visakhapatnam-530049

Abstract:
India's vehicle population is growing at a quicker rate, making traffic management one of the country's biggest issues. When every infraction on the road is frequently found, traffic may be managed effectively. Due to the inefficiency of using current technology in conjunction with conventional/manual methods to detect violations of traffic rules, traffic management has become extremely challenging. In order to facilitate traffic management, a system that uses image processing technology to identify serious infractions such as speeding, helmet identification, and number plate recognition is being proposed for this project. With the advent of new and developing technologies, most people now consider traffic rule violations to be a serious problem. most developing nations. The number of cars on the road is rising quickly along with the population, and traffic infractions are also rising at an exponential rate. As a result, handling traffic infractions has grown difficult. Despite the fact that there are numerous automated solutions available to address traffic infractions, managing such settings is extremely difficult because of the uneven lighting and variety of license plate types. Therefore, the solution to this issue is to create a system that is integrated with several characteristics, such as speed estimation to ascertain the frequency of a driver's infractions of the law, and traffic signal detection. This technique can be used in conjunction with speed estimate to detect over speeding, as it can identify violations of traffic signals. This data is sent to the database so that the relevant authorities can take the appropriate action against the rule violators.

Keywords:
YOLOv3, Feature Pyramid Network, Neural Network Architecture, and Darknet-53 Method.

Introduction:

Necessary measures to combat traffic infractions. This can recognize the most common types of infractions. The main goal of this system is to efficiently detect and monitor the vehicles and their movements. Since the authorities constantly monitor the roadways, a real-time traffic violation detection system is required. Traffic enforcers will therefore be more at ease enforcing safe roads precisely and effectively because the traffic detection system identifies infractions more quickly than people. The system is equipped with an intuitive graphical user interface that facilitates system operation, traffic monitoring, and enforcement of traffic rule breaches. In real time, our system is able to identify the three most prevalent types of traffic violations.

Literature Survey:

Utilizing YOLO-based object identification, the system first identifies motorcycles. It then verifies that each motorcycle complies with specific regulations, such wearing a helmet and utilizing a crosswalk. To identify helmet infractions, a CNN (convolutional neural network) based classifier is employed. Violation detection systems based on computer vision are a very useful tool for monitoring and disciplining traffic violations. This system is designed to detect traffic infractions like speeding, counting motorcycles, and signal violation by using YOLOV3 object detection. Convolution neural networks (CNN) and other object detection algorithms are used in traffic surveillance applications. There is always one hidden layer in the input and one in the output of a neural network. This article makes use of an intelligent system called CBITS. It will go over the following features, like accident identification and emission monitoring. This work provides an autonomous approach for identifying

one-way traffic regulation breaches without human intervention. Since three-wheeled cars were more likely to violate one-way traffic restrictions, they were taken into consideration. Video analysis techniques are used in traffic research for many purposes, such as classifying and counting vehicles, identifying collisions, and assessing traffic density. With the proposed system, vehicle recognition and tracking of wrong-way violations are made possible.
The first paper was Titled as "Traffic Rules Violation Detection using Deep Learning," by Aniruddha Tonge, S. Chandak, R. Khiste, U. Khan, and L. A. Bewoor, in the 2020 4th International Conference on Electronics, Communication, and Aerospace Technology (ICECA). pp. 724728 (ICPS).
The second paper was titled as Using artificial intelligence and deep learning, Ruben J. Franklin and Mohana "Traffic Signal Violation Detection," in the 2020 5th International Conference on Communication and Electronics Systems (ICCES), 2020.
The third paper was titled as the performance analysis of the object detection algorithm for the intelligent traffic surveillance system was conducted by Chetan Kumar B, Punitha R, and Mohana. The findings were published in the 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA).
The fourth paper was titled as “Cloud Based Intelligent Traffic System to Implement Traffic Rules Violation Detection and Accident Detection Units,” Siddharth Tripathi, Uthsav Shetty, Asif Hasnain, and Rohini Hallikar, Proceedings of the Third International Conference on Trends in Electronics and Informatics ICOEI, 2019.

Conclusion:
In conclusion, improving road safety would be greatly aided by a traffic rules detection system that effectively recognizes and complies with a variety of traffic regulations. By informing drivers about traffic conditions, road signs, and other context-sensitive safety regulations, these systems can be made to help drivers. They may make use of a variety of technology, like as artificial intelligence, cameras, and sensors, to precisely perceive and respond to the ever-changing road environment. By guaranteeing that drivers continually follow traffic regulations, integrating this cutting-edge technology into the vehicle safety framework may help lower the number of fatalities and accidents on the road. Such a system's efficacy would depend on its capacity to precisely and instantly detect and process a variety of inputs, thereby supporting the safe and efficient.

References:
1. pp. 724728 (ICPS). "Traffic Rules Violation Detection using Deep Learning," by Aniruddha Tonge, S. Chandak, R. Khiste, U. Khan, and L. A. Bewoor, in the 2020 4th International Conference on Electronics, Communication, and Aerospace Technology (ICECA), pp. 12501257, doi:10.1109/ICECA49313.2020.9297495.
2. Using artificial intelligence and deep learning, Ruben J. Franklin and Mohana "Traffic Signal Violation Detection," in the 2020 5th International Conference on Communication and Electronics Systems (ICCES), 2020, pp. 839–844, doi: 10.1109/ICCES48766.2020.9137873.
3. The performance analysis of the object detection algorithm for the intelligent traffic surveillance system was conducted by Chetan Kumar B, Punitha R, and Mohana. The findings were published in the 2020 Second International Conference on Inventive Research in Computing Applications (ICIRCA), pp. 573–579, doi:10.1109/ICIRCA48905.2020.9182793.
4. “Cloud Based Intelligent Traffic System to Implement Traffic Rules Violation Detection and Accident Detection Units,” Siddharth Tripathi, Uthsav Shetty, Asif Hasnain, and Rohini Hallikar, Proceedings of the Third International Conference on Trends in Electronics and Informatics (ICOEI 2019), IEEE Xplore Part Number. ISBN:973-1-5386-9439-8; CFP19J32-ART.
5. In the 2019 International Conference on Intelligent Computing and Control System (ICCS), pp. 1453-1457, Helen Rose Mampilayil and R.K., “Deep learning- based Detection of One- Way Traffic Rule Violation of Three- where Vehicles,” doi:10.1109/ICCS45141.

6. In the 2019 International Artificial Intelligence and Data Processing Symposium (IDAP), Ali etnas, S. Kul, and A. Sayar, "Real-Time Traffic Rules Infringing Determination Over the Video Stream: Wrong Way and Clearway Violation Detection," pp. 1-4, doi:10.1109/IDAP.2019.887
7. 2018 5th International Conference on Signal Processing and Integrated Networks (SPIN), pp. 154–158, doi:10.1109/SPIN.2018.8474067, M. Purohit and A. R. Yadav, "Comparison of feature extraction techniques to recognize traffic rule violations using low processing embedded system,"
8. "Smart and Digitalized Traffic Rules Monitoring System," 3rd International Conference on Communication and Electronics Systems (ICCES), 2018, pp. 969-973, doi: 10.1109/CESYS.2018.8724086, S. P. Mani Raj, B. Rupa, P. S. Sravanthi, and G. K. Sushma.
9. Shashank Singh Yadav, V. Vijayakumar and J. Athanesious, "Detection of Anomalies inTraffic Scene Surveillance," 2018 Tenth International Conference on Advanced Computing (ICoAC), 2018, pp. 286-291, doi: 10.1109/ICoAC44903.2018.8939111.
10.R. Shreyas, B. V. P. Kumar, H. B. Adithya, B. Padmaja and M. P. Sunil, "Dynamic trafficrule violation monitoring system using automatic number plate recognition with SMS feedback," 2017 2nd International Conference on Telecommunication and Networks (TELNET), 2017, pp.1-5, doi: 10.1109/TEL-NET.2017.8343528.
11.G. Ou. Y. Gao and Y. Liu, "Real Time Vehicular Traffic Violation Detection in Traffic Monitoring System," in 2012 IEEE/WIC/ACM, Beijing, China, 2012.
12.X. Wang, L.-M. Meng, B. Zhang, J. Lu and K.-L. Du, "A Video-based Traffic Violation Detection System," in MEC, Shenyang, China, 2013.
13.Joseph Redmon and Ali Farhadi, "YOLOv3: An Incremental Improvement".
14.Mukremin Ozkul, Ilir Capuni (2018)." Police-less multiparty traffic violation detection and reporting system with privacy preservation", IET Intelligent Transport Systems, Vol.12 No. 5, pp. 351-358.
15.Wang J., Chen, Z., Li P., Sheng B., & Chen R (2019), 'Real Time Non-Motor Vehicle Violation Detection in Traffic Scenes' 2019 IEEE International Conference on Industrial Cyber Physical Systems (ICPS), pp. 724728.