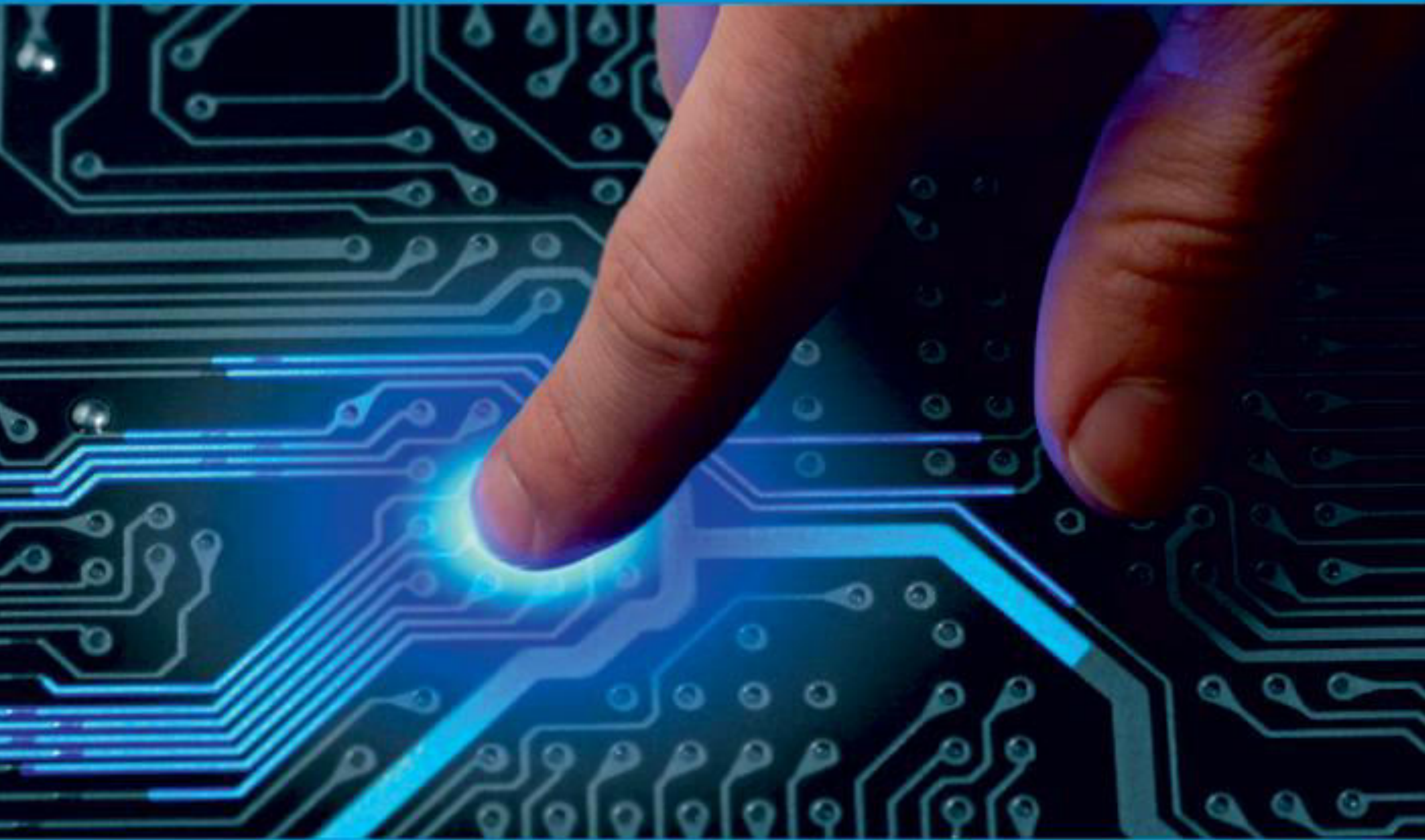
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 3, March 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 3, March 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1203099 |

Smart Traffic Monitoring & Management System

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ABSTRACT: For smart city management, efficient handling of road traffic is one of the key aspects. Traffic congestion can be managed effectively, if the numbers of vehicles that are to pass through a crowded junction can be pre-estimated in time. The proposed method presents a framework, which has the capability to continuously convey the vehicle count and manage the traffic according to number of vehicles in pune city. The number of vehicles passing through a location well before the required traffic junction can be estimated using the help of image processing techniques. Through traffic management, the road contain more traffic can get more time to pass the vehicle and the road in which there is no traffic they do not allocate any time.

KEYWORDS: YOLO Algorithm, PYGame, PYAUTOGUI, Open-CV, Ultralytics.

I. INTRODUCTION

Indian city managing system is a combination of many interdependent systems, in which traffic management plays a significant role. Moreover, it can be stated as one of the key aspects of the smart city. The world is moving very fast and it has to keep moving this way for continuous development. On contrary, modern transport is failing to provide smooth transportation system to the people. Excessive traffic jams lead to delays in reaching workplace or home, wastage of fuel, wear and tear on vehicles or even a road rage by the stressed and frustrated motorists. In addition, an increasing population is directly resulting in an increasing traffic related problems such as over speeding, accidents, hit and run, and so on. Criminal activities like mobile snatching at traffic signals also happen in metropolitan cities during long traffic jams. Therefore, an intelligent traffic management has evolved as a compulsory requirement for a prosper civilization. Currently, smart traffic control systems are being preferred over fixed time systems in most of developing nations. This type of traffic controlling is being monitored largely through CV cameras.

Although it seems to pervade everywhere, megacities are the ones most affected by it. And its ever-increasing nature makes it necessary to calculate the road traffic density in real-time for better signal control and effective traffic management.

II. RELATED WORK

[1.] Traffic Signal Control Systems: Explore existing research on traffic signal control systems, especially those incorporating smart technologies. Look for papers discussing adaptive signal control methods that take into account real-time traffic conditions. [2.] Vehicle Detection Techniques: Investigate papers covering various vehicle detection techniques, such as computer vision, radar, LiDAR, and sensors. Understand how these methods contribute to accurate vehicle counting and classification. [3.] Machine Learning for Vehicle Classification: Look for research that utilizes machine learning algorithms for vehicle classification. This can include papers on image processing, deep learning, or other AI techniques for identifying and categorizing vehicles based on types. [4.] Communication Protocols in Smart Traffic Systems: Explore papers discussing communication protocols used in smart traffic systems for data exchange between sensors, traffic lights, and central control systems. Understanding efficient communication is crucial for timely signal adjustments. [5.] Real-Time Data Analysis: Investigate how real-time data analysis is applied in traffic monitoring. This can include papers on data analytics techniques that process and interpret vehicle count information quickly for signal control decisions. [6.] Integration of IoT in Traffic Management: Explore research on the integration of Internet of Things (IoT) technologies in traffic management. Understand how IoT devices contribute to the collection of data and communication between different components of a smart traffic system. [7.] Case Studies and Implementations: Look for papers that present case studies or real-world implementations of smart traffic monitoring systems. Understanding practical applications and their outcomes provides valuable insights.

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III. METHODOLOGY

The proposed methodology of the traffic monitoring system aims to efficiently analyze and manage traffic flow by utilizing computer vision techniques and a YOLO (You Only Look Once) model for vehicle detection. This comprehensive approach involves several key steps to achieve accurate and real-time results. The system begins by capturing video frames from specified video paths. To ensure diversity in traffic scenarios, frames are selected at random time intervals. This randomness introduces variability into the captured frames, enabling the model to handle different traffic conditions effectively. The real-time aspect of the system is crucial for adaptive traffic signal control. As vehicles are detected and classified, the system continuously analyzes the data to provide immediate feedback on traffic conditions. This real-time analysis ensures that signal adjustments can be made promptly based on the current state of the road.

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IV. PROPOSED METHODOLOGY

Analyzing traffic according to vehicle type is a crucial aspect of modern traffic management systems. This approach involves classifying and quantifying different types of vehicles on the road, providing valuable insights for various purposes, including urban planning, traffic flow optimization, and environmental impact assessment. Here are key points related to analyzing traffic based on vehicle types:

1. Vehicle Classification: - Object Detection Techniques: Utilize advanced computer vision techniques, such as deep learning models like YOLO or CNNs (Convolutional Neural Networks), to detect and classify vehicles in real-time. - Feature Extraction: Extract relevant features from detected vehicles, such as size, shape, and color, to enhance the accuracy of classification.

2. Data Collection and Processing: - Video Streams and Sensors: Implement sensors, cameras, or video feeds at strategic locations to capture real-time traffic data. - Data Preprocessing: Clean and preprocess the captured data, including resizing images, to ensure optimal performance during classification.

V. SIMULATION RESULTS

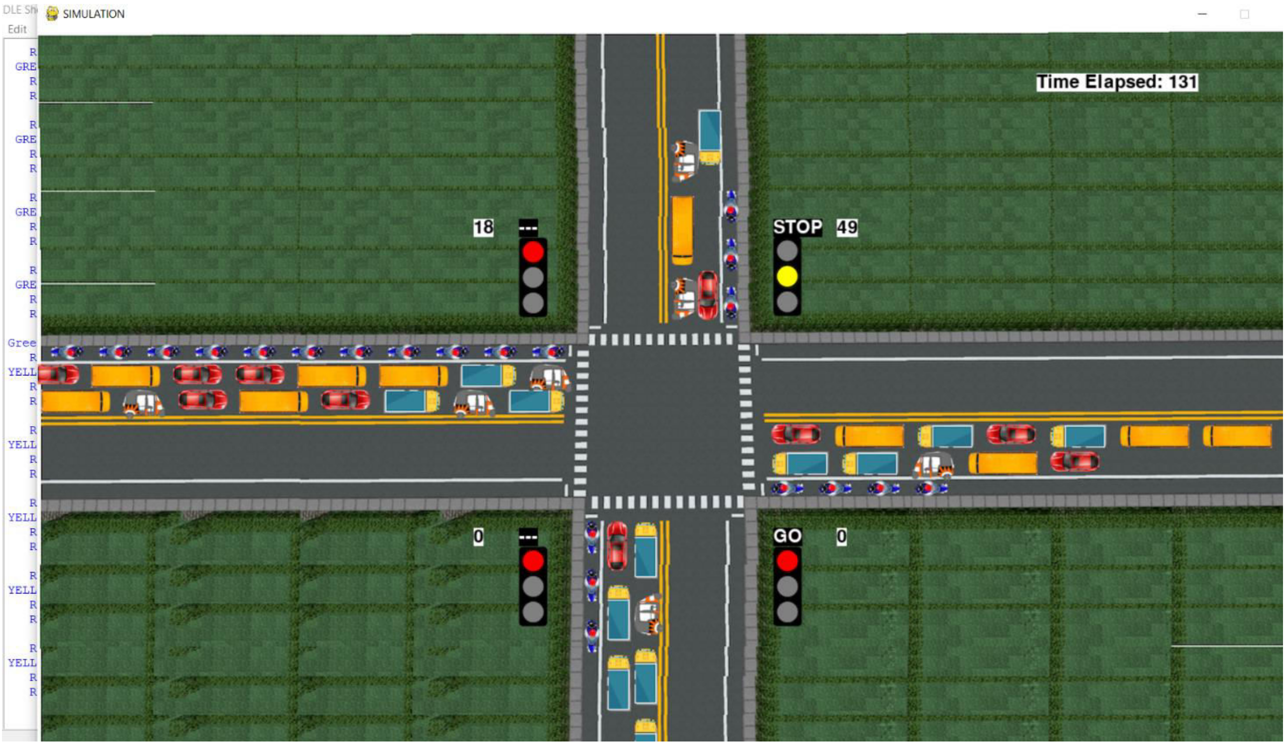

FIG. SIMULATION OF SMART TRAFFIC AND MONITORING SYSTEM.

Once the areas are defined and the YOLO model is loaded, the system processes each selected frame. Vehicles within the specified areas are detected and classified based on their types (e.g., car, motorbike, truck). The system takes advantage of the model's ability to provide bounding box coordinates, enabling precise identification and counting of vehicles.

Investigate how real-time data analysis is applied in traffic monitoring. This can include papers on data analytics techniques that process and interpret vehicle count information quickly for signal control decisions.

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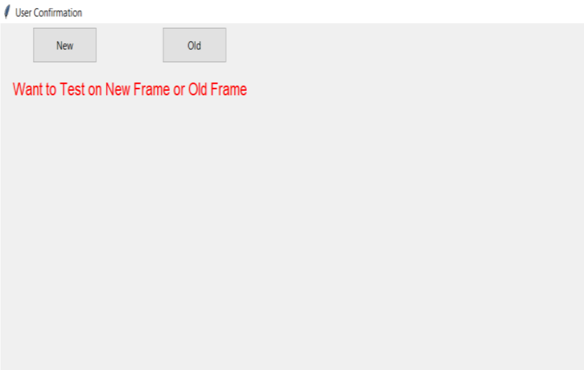

Fig. Home page

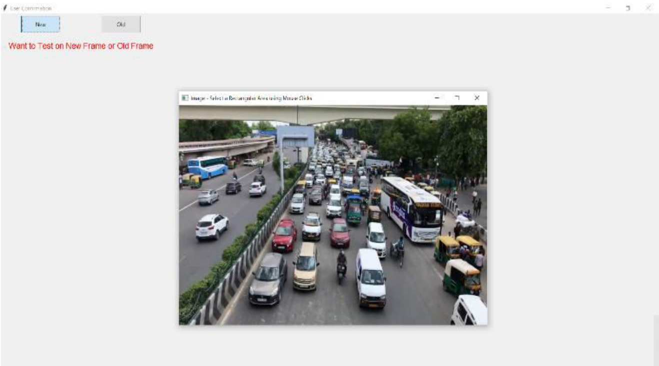

Fig. Select 4 coordinates from the images

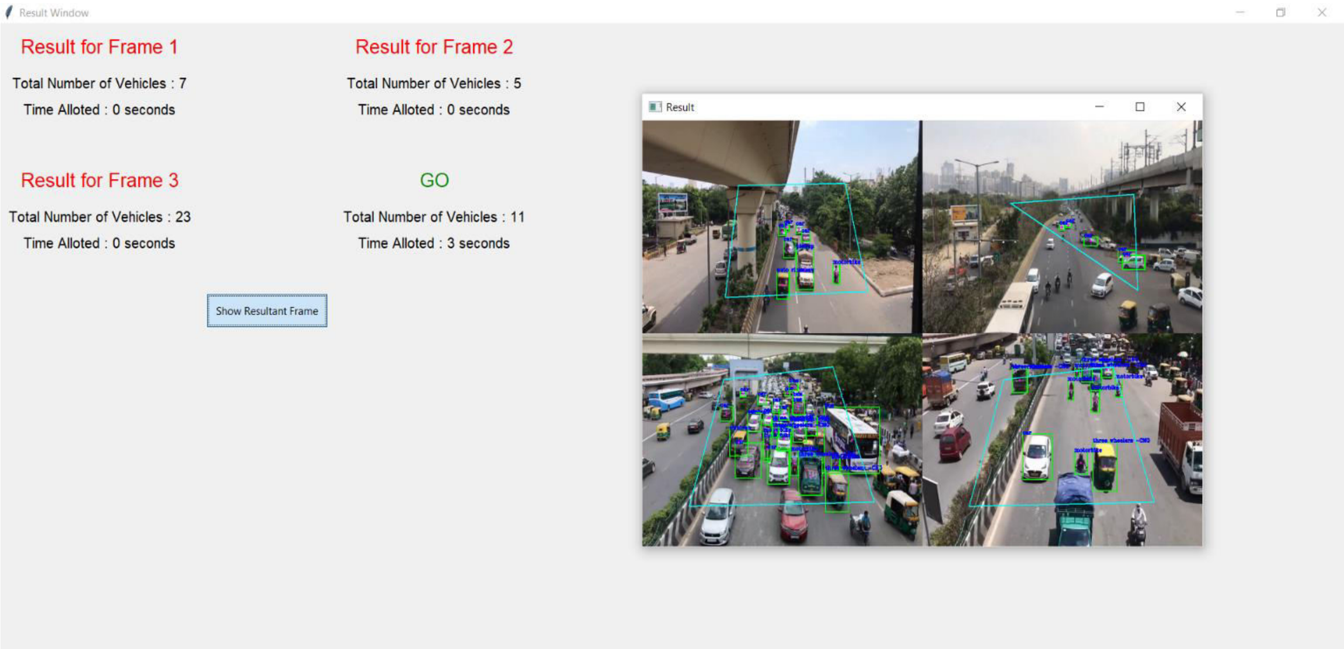

FIG. DETECT THE VEHICLES AND ANALYZE THE TRAFFIC.

VI. CONCLUSION AND FUTURE WORK

Traffic management in many regions of the world. But the task is time-consuming, costly, complex, and disturbing work. Employing technology as a key monitoring and management tool to overcome obstacles is a vice decision over physical infrastructure destruction. The smart traffic management system can provide intelligent insights and solutions for current problems through a few modifications and tech integrations. AI is evolving as a prominent tool in every sector. And the future traffic management system for the smart community would be an smart traffic management system.

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REFERENCES

[1] Chakraborty, P.; Adu-Gyamfi, Y.O.; Poddar, S.; Ahsani, V.; Sharma, A.; Sarkar, S. Traffic congestion detection from camera images using deep convolution neural networks. Transp. Res. Rec. 2018, 2672, 222–231. [Google Scholar] [CrossRef][Green Version].

[2] Morris, T.; Schwach, J.A.; Michalopoulos, P.G. Low-Cost Portable Video-Based Queue Detection for Work-Zone Safety; Technical Report No. 1129; Department of Civil Engineering, University of Minnesota: Minneapolis, MN, USA, 2011. [Google Scholar]

[3] Fouladgar, M.; Parchami, M.; Elmasri, R.; Ghaderi, A. Scalable deep traffic flow neural networks for urban traffic congestion prediction. In Proceedings of the 2017 International Joint Conference on Neural Networks (IJCNN), Anchorage, AK, USA, 14–19 May 2017;

[4] IEEE: Piscataway, NJ, USA; pp. 2251–2258. [Google Scholar]

[5] Max Yuh Wang Y, Wang Y. Large-scale transportation network congestion evolution prediction using deep learning theory. PLoS ONE 2015, 10, e0119044. [Google Scholar] [CrossRef] [PubMed]

[6] Carli, R.; Dotoli, M.; Epicoco, N.; Angelico, B.; Vinciullo, A. Automated evaluation of urban traffic congestion using bus as a probe. In Proceedings of the 2015 IEEE International Conference on Automation Science and Engineering (CASE), GothenEburg, Sweden, 24–28 August 2015;

[7] IEE: Piscataway, NJ, USA; pp. 967–972. [Google Scholar]

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