



International Journal of Innovative Research in Science Engineering and Technology (IJIRSET)

(A Monthly, Peer Reviewed, Refereed, Scholarly Indexed, Open Access Journal)



Impact Factor: 8.699

Volume 14, Issue 3, March 2025

AI based Traffic Surveillance System

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ABSTRACT: The most important challenge to sustainable mobility is persistent congestions of differing strength and duration in the dense transport networks. The standard Adaptive Traffic Signal Control cannot properly address this kind of congestion. Deep learning-based mechanisms have proved their significance to anticipate in adjective outcomes to improve the decision making on the predictions of traffic length. The deep learning models have long been used in many application domains which needed the identification and prioritization of adverse factors for a simplifying human life. Several methods are being popularly used to handle real time problems occurring from traffic congestion. This study demonstrates the capability of DL models to overcome the traffic congestion by simply allowing the vehicles through a signal depending on the length of vehicles. Our proposed method integrates a numeral of approach, intended to advance the cooperativeness of the explore operation. In this work, we develop the application to regulate the traffic by releasing better signal at desired time intervals.

KEYWORDS: Traffic, YOLO, Deep Learning.

I. INTRODUCTION

Artificial intelligence (AI)-driven traffic surveillance technologies are becoming a game-changer in the fight against urban traffic congestion. These systems analyse real- time traffic camera data using sophisticated algorithms to provide useful insights that improve urban mobility. Artificial intelligence (AI) enables cities to effectively and efficiently handle the difficulties of modern transportation by forecasting patterns of congestion and optimising traffic flow.

II. EASE OF USE

Real-time monitoring capabilities provided by AI-based traffic surveillance systems enable authorities to promptly handle traffic jams and accidents. These systems use predictive analysis to forecast traffic patterns, which enables preemptive actions to avoid bottlenecks. They maximise the use of available resources, reducing traffic and fuel usage by adjusting traffic signals dynamically. Furthermore, they provide flexible tactics for dynamic traffic control, guaranteeing effective flow even in the face of shifting circumstances. These systems provide data-driven decision-making to assist larger smart city programmes, promoting enhanced urban mobility and sustainability. They offer scalable deployment choices across various urban environments.

III. SCOPE

The scope of this project encompasses the development and implementation of deep learning models and algorithms for traffic prediction within Intelligent Transportation Systems (ITS). This includes data collection, preprocessing, feature engineering, model architecture design, training, and validation. The project aims to forecast various traffic parameters, such as congestion, travel times, and traffic flow, using diverse data sources like sensors, GPS, and traffic cameras. Ethical considerations related to data privacy and responsible use of deep learning in traffic management will also be explored. The ultimate GOAL IS TO PROVIDE URBAN PLANNERS, TRANSPORTATION AUTHORITIES, AND COMMUTERS WITH RELIABLE TRAFFIC PREDICTIONS FOR

ENHANCED MOBILITY AND EFFICIENCY.

IV. EXISTING SYSTEM

To fully understand just how powerful this traffic congestion problem is, we need to look at it from the very beginning which is traditional way of controlling traffic. Traditional way basically uses, a person should make traffic observations to estimate or provide the clearance to the lane which consists of high count of vehicles. Traditional method later updated by using remotes-controlled system to give the right signal to the lanes. And these practices fail because the persons may not be available at every time at the traffic center.).

A. DISADVANTAGES:

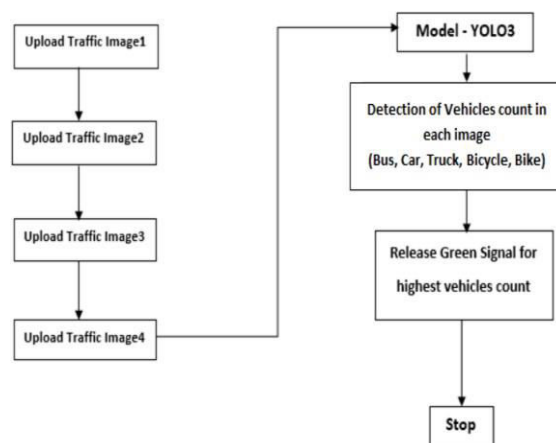
1. Low Efficiency: The system operates with suboptimal resource utilization, often resulting in sluggish performance and inefficiencies in delivering desired outcomes.
2. Time Consuming: Requires a substantial amount of time to complete tasks or processes, which may lead to delays or inefficiencies.
3. High Complexities: Involves intricate and interconnected elements, demanding specialized knowledge or skills to manage or understand effectively.
4. Resources Consuming: Utilizes significant resources, such as computational power, manpower, or financial investment, potentially straining available assets.

B. PROPOSED METHOD:

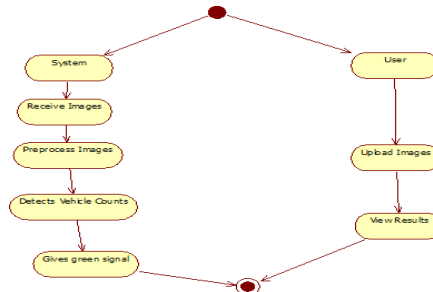
We propose this application that can be considered a useful system since it helps to reduce the limitations obtained traditional methods. By providing support through the a AI based analysis, it can be able to generate best results for attributes without any overlap. The system is developed in a Flask based Python environment. The models involved in this application are YOLO..

C. Figures and Tables:

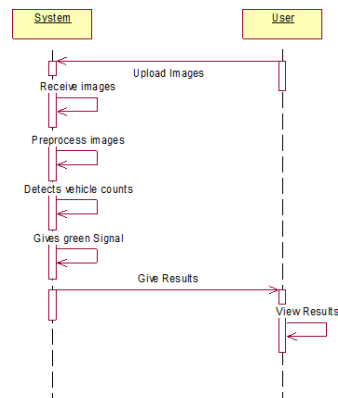
a) FLOW OF THE PROJECT:



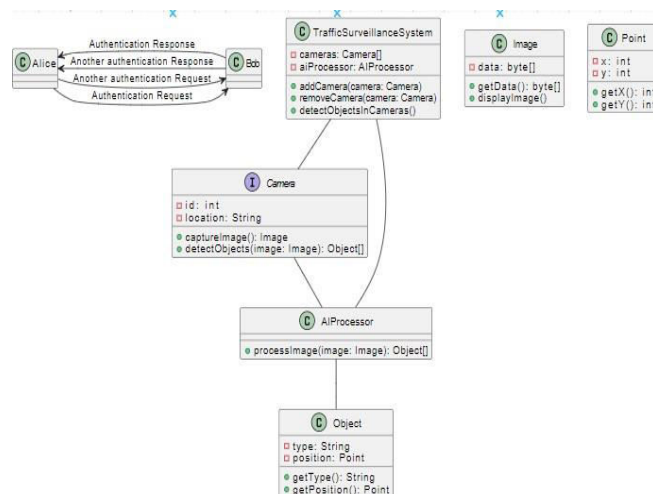
b) SEQUENCE DIAGRAM:



c) ACTIVITY DIAGRAM:



d) CLASS DIAGRAM:



V. ADVANTAGES

1. High Efficiency: The system operates with optimal resource utilization, achieving desired outcomes promptly and effectively while minimizing waste, enhancing productivity.
2. Time Saving: Tasks are completed quickly, reducing time requirements and streamlining processes for improved efficiency.
3. Low Complexities: Involves straightforward and manageable elements, making tasks easy to understand and execute with minimal intricacies or complications.

A. REQUIRMENTS:**HARDWARE CONFIGURATION:**

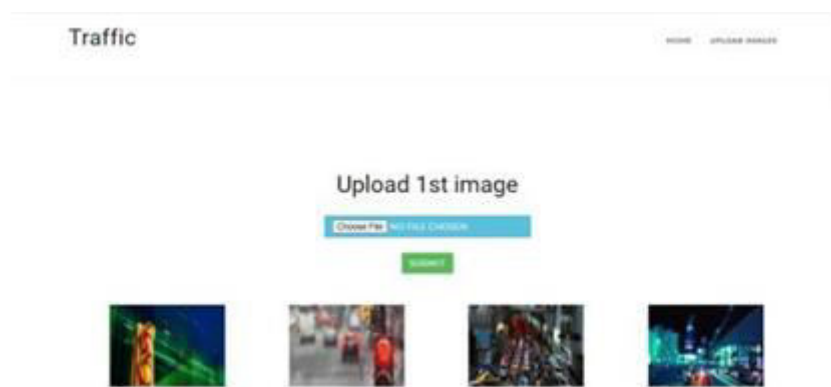
- PROCESSOR - I3/INTEL PROCESSOR
- RAM - 4GB (MIN)
- HARD DISK - 128 GB SOFTWARE CONFIGURATION:
- OPERATING SYSTEM : WINDOWS 7+
- SERVER-SIDE SCRIPT : PYTHON 3.6+
- IDE : PYCHARM
- LIBRARIES USED : PANDAS, NUMPY, SKLEARN, YOLO
- FRAMEWORK : FLASK

B. IMPLEMENTATION:**MODULES****➤ System**

- 1.1 Receive Images: The system will receive images from user.
- 1.2 Pre-processing: The system will perform pre-processing on the uploaded images.
- 1.3 Detects Vehicles count: The system will detect the vehicle counts.
- 1.4 Gives green signal: The system then clears the traffic by giving green signal.

➤ User**2.1 Upload Images:**

- a. Upload image-1
- b. Upload image-2
- c. Upload image-3
- d. Upload image-4

2.2 View Results: Clear the lane which has highest vehicle count by simply giving green signal.

Traffic HOME UPLOAD-IMAGES

Upload 2nd image

[Choose File](#) [NO FILE CHOSEN](#)

[SUBMIT](#)



Upload 3rd image

[Choose File](#) [NO FILE CHOSEN](#)

[SUBMIT](#)



Traffic HOME UPLOAD-IMAGES

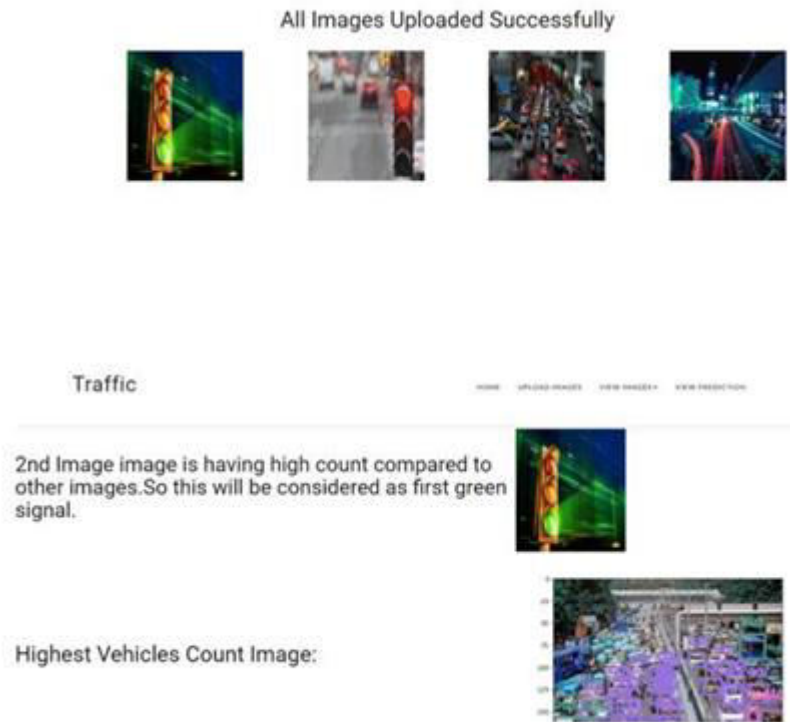
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Traffic HOME UPLOAD-IMAGES VIEW IMAGES VIEW PREDICTION



VI. FUTURE WORK

- **Integration of Emerging Technologies:** Incorporate advancements like autonomous vehicles and AI for improved system efficiency.
- **Enhanced Data Analytics:** Refine data analysis for better prediction of traffic patterns and congestion management.
- **Expansion of Multi-Modal Solutions:** Introduce more options like micro-mobility services to reduce reliance on cars.
- **Sustainable Transportation Initiatives:** Promote electric vehicles and pedestrian-friendly infrastructure for environmental benefits.
- **Community Engagement:** Involve diverse stakeholders in planning and implementation for inclusive solutions.
- **Resilience and Adaptation:** Prepare for climate change impacts with resilient infrastructure and emergency plans.
- **Policy and Regulatory Frameworks:** Advocate for supportive policies to drive innovation and collaboration.
- **Research and Development:** Invest in R&D for addressing emerging transportation challenges.
- **Public Education and Awareness:** Promote safe and sustainable transportation behaviors through education campaigns.

VII. CONCLUSION

In conclusion, the proposed traffic management system presents a promising solution to address the complex challenges of urban mobility and transportation efficiency. By leveraging advanced technologies, data-driven decision-making, and innovative strategies, the system aims to improve traffic flow, enhance safety, and promote sustainable transportation practices. However, it is essential to acknowledge the potential limitations and challenges associated with implementation, including high initial costs, technical complexities, and concerns regarding data privacy and equity. Despite these challenges, the proposed system offers significant opportunities for enhancing the overall quality of life for residents, supporting economic growth, and creating more resilient and livable communities. With careful planning, stakeholder engagement, and ongoing monitoring and adaptation, the proposed system has the potential to

transform urban transportation networks and pave the way for a more efficient, safe, and sustainable future.

ACKNOWLEDGMENT

“The single greatest cause of happiness is gratitude.”

-Auliq-Ice

We would like to extend our heartfelt gratitude to everyone who helped us finish this AI-based traffic surveillance system project successfully. First and foremost, we would want to express our sincere gratitude to Ms. Muskan Kuamri, our project supervisor, for all of their help and assistance during this project. Their knowledge and perceptions have been crucial in determining the course and calibre of our research. I am deeply Greatful to Dr. Amit Barve, Head of Department of CSE and Dr. Vipul Vekariya, Dean

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