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Machine Learning Based Traffic Prediction System

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Abstract

Persistent congestions in the dense transportation networks, which vary in strength and length, pose the biggest threat to sustainable mobility. This kind of congestion cannot be effectively handled by the adaptive traffic signal control standard. Deep learning-based algorithms have demonstrated their value in anticipating adjective outcomes to enhance decision-making on traffic length estimates. The identification and prioritization of harmful elements in order to make human life simpler required the use of deep learning models, which have been around for a while in various application domains. To deal with issues brought on by traffic congestion in real time, a variety of techniques are in use. This study demonstrates how DL models can relieve traffic congestion by merely allowing vehicles to pass through a signal based on their length. Our Our suggested technique combines a number of strategies in an effort to strengthen the exploration operation's teamwork. In this work, we put into practice an application that counts the number of automobiles in user-provided photos. We are utilizing the YOLO pretrained weights in this case to detect the number of vehicles.

1. INTRODUCTION

1.1 Introduction

By resolving numerous extremely difficult and sophisticated real-world challenges during the previous ten years. Nearly every real-world industry, such as healthcare, autonomous vehicles (AV), commercial applications, and image processing, was represented in the application fields. In contrast to conventional algorithms, which execute programming instructions based on conditional statements like if-else, DL algorithms often learn through trial and error. Simplifying human problems is one of the most important applications of DL, and governments from every sector are expressing interest in integrating AI into their systems in a variety of fields, including the medical one. Many different models can be used to operate under real-time situations. Numerous studies have been conducted employing deep learning approaches for traffic regulation, including image segmentation, object detection, etc. The study is particularly concentrated on live traffic regulation close to a traffic signal and is also concentrated on reducing waiting times dependent on vehicle counts and prompt reaction. When making decisions to address the current situation and to direct early interventions to manage these traffic restrictions very well, these methods can be very beneficial. The goal of this project is to develop a better system that can release traffic based on the number of vehicles. The goal of this project is to create a web application to manage "Traffic Congestion". The user interface is created using Python-Flask as the front end. The database is created using MySQL, which is also used to store the details. The software is considered user friendly because it can be used easily by anyone with basic computer skills..

2. Literature Survey

1] Rutger Claes, Tom Holvoet, and Danny Weyns. A decentralized approach for anticipatory vehicle routing using delegate multiagent systems. IEEE Transactions on Intelligent Transportation Systems:, Modern vehicle guidance systems guide traffic and reduce congestion using real-time traffic data. Unfortunately, these technologies are only able to respond when there are traffic jams and cannot stop the unnecessary production of gridlock. In that regard, anticipatory vehicle routing shows promise because it enables guiding vehicle routing while taking traffic forecast information into consideration. In large-scale dynamic situations, this research provides a decentralized method for anticipatory vehicle routing. The strategy is built on delegate multiagent systems, a coordinating mechanism focused on the environment and somewhat inspired by ant behavior. For the benefit of moving objects, ant-like agents probe their surroundings and spot a forecast of congestion, which enables rerouting. The method is thoroughly explained and assessed against alternatives. with three different routing techniques. The experiments are carried out in a traffic environment simulation. The studies show a significant performance improvement over the test's most sophisticated routing method, a traffic-message-channel-based routing technique.

[2] Mehul Mahrishi and Sudha Morwal. Index point detection and semantic indexing of videos - a comparative review. Advances in Intelligent Systems and Computing, Springer, 2020: In extreme situations, such as in disaster-affected areas, Mobile Ad Hoc Network (MANET) has the capacity to self-configure and create a mobile wireless mesh. AODV routing is one of the MANET routing techniques. One of the reactive routing methods required to deliver data is AODV. However, AODV has flaws that make it susceptible to harsh environmental conditions when used in catastrophe situations. In this project, communication that is disrupted by disaster will be modeled. In order to enhance network performance, MANET AODV-DTN is used. By changing the number of nodes to be 0.431%, this system can raise the Probability Delivery Ratio (PDR) parameter value, resulting in a 63.525% average latency reduction. and production saw a rise in energy use of 0.170%. PDR's simulation with variable speed change reduced average delay by 78.710% while increasing energy consumption by 0.167%. Changes to the buffer size variables led to PDR results of 0.729%, a reduction in average latency of 71.603%, and an increase in energy usage of 0.161%. According to these findings, MANET AODV-DTN is superior to MANET AODV..

3. OVERVIEW OF THESYSTEM

3.1 Existing System

We must start with the traditional method of traffic control in order to fully comprehend the magnitude of the problem of traffic congestion. The traditional method essentially calls for someone to estimate or give clearance to a lane with a high volume of traffic by making traffic observations. The traditional approach was then improved to use a remote-controlled device to signal the lanes appropriately. These procedures also don't work since people might not always be available at the traffic center..

3.1.1 Disadvantages of Existing System

- Less feature compatibility
- Low accuracy.

3.2 Proposed System

The Yolo pretrained weights are used in the proposed system, along with an examination of the X and Y junctions, to identify cars at intersections. In an x junction, the cars can drive freely to the left, and we've picked two examples of this: if the first lane has a lot of vehicles, those vehicles can move freely to the left and straight with the third lane, and the third lane can also do the same thing. The same rule also applies to the second and fourth lanes. The three prerequisites for a Y junction are as follows: if the first lane has high images, it can move freely left and right; the same is true for the other two lanes.

3.3 Methodology

In this project work, I used five modules and each module has own functions, such as:

1. System Module
2. User Module

3.3.1 Dataset Collection:

The dataset containing images of the traffic images which are to be classified is split into training and testing dataset with the test size of 30-20%.

3.3.2 Preprocessing:

Resizing and reshaping the images into appropriate format to train our model.

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3.3.3 *Training:*

Use the pre-processed training dataset is used to train our model using CNN algorithm along with some of the transfer learning methods.

3.3.4 Detects Vehicle Count

The system will detect the vehicle counts gives green signal.

3.3.5 User Module

Upload Image

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

View Results

Clear the lane which has highest vehicle count by simply giving green signal.

4 Architecture

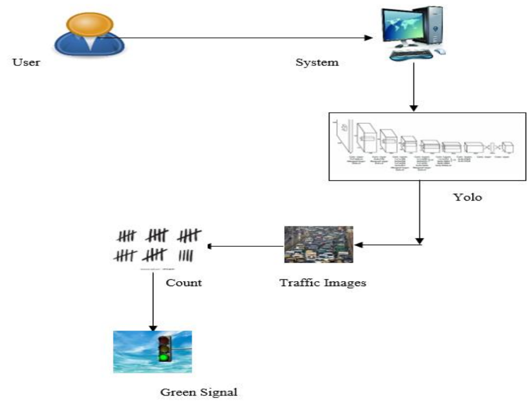


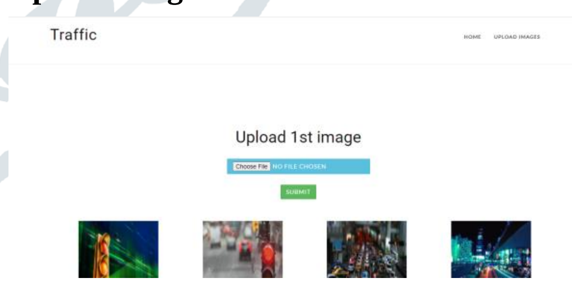
Fig 1: Frame work of proposed method

Above architecture diagram shows three stages of data flow form one module to another module. Data collection, preprocessing, and algorithm training.

5 RESULTS SCREEN SHOTS

Home Page:

Upload image:



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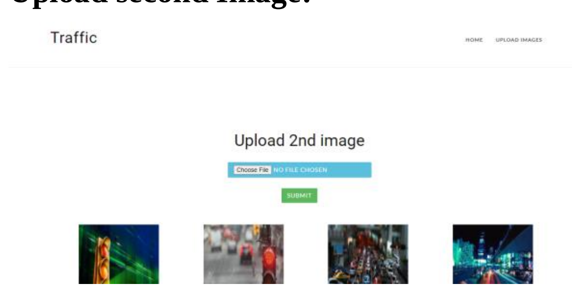

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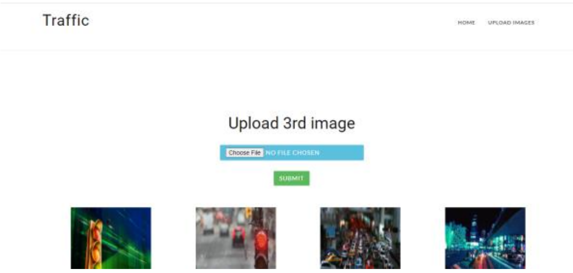
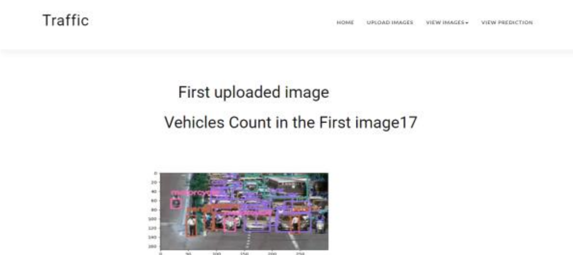


Result;



7. CONCLUSION

✓ With this application, we've successfully developed a system that automatically manages traffic signals at X and Y junctions. This is created in a user-friendly setting utilizing Python programming and Flask. To clear signals for the lanes with the most vehicles, the system is likely to gather photographs from the user.

8. References

[1] Rutger Claes, Tom Holvoet, and Danny Weyns. A decentralized approach for anticipatory vehicle routing using delegate multiagent systems. IEEE Transactions on Intelligent Transportation Systems, 12(2):364–373, 2011.

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[4] Chun-Hsin Wu, Jan-Ming Ho, and D. T. Lee. Travel-time prediction with support vector regression. IEEE Transactions on Intelligent Transportation Systems, 5(4):276–281, Dec 2004.