International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 06 Issue: 05 | May - 2022 Impact Factor: 7.185 ISSN: 2582-3930

Management of Traffic Dynamically Using Yolo

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ABSTRACT

Traffic congestion is rampant in the world today. Traffic congestion is increasing daily, and the normal way of handling world traffic is not enough. If the number is low. Only in that particular situation where the normal approach works well. In some cases, traffic congestion on the other side of the road may be increased, or the former road system may fail if traffic on one side of the road is too high. Because we live in a fast-paced era, no one wants to wait long hours at any cost, and everyone chooses high-speed roads. Therefore, control measures should be put in place to reduce traffic congestion. We are launching a CNN (Convolutional Neural Network) strategy based on Image Processing to control traffic signals and avoid traffic congestion. The number of vehicles caught in traffic is calculated using the CNN (Convolutional Neural Network) classifiers. As a result, we aim to redesign the traffic signal system now that changes the stationary mode so that the signal changes. The difference in signal time is calculated by the precise image sensor for heavy traffic. This will be an effective practice for the immediate release of tight traffic.

Keywords: Image Processing, CNN, Yolo, Traffic Congestion.

I. INTRODUCTION

People prefer to travel in their own cars rather than taking a public or shared day trip, which results in a significant number of vehicles on the road. The increase in the number of vehicles on the road presents a number of problems, the most serious of which is traffic congestion. In such a situation, no one can be compelled to limit the use of private vehicles, but we must control traffic congestion so as not to reduce traffic congestion.

There are many plans in place to convert cities from conventional transportation systems to "Smart Systems," and many proposals are considered part of this framework, one of which is the Smart Travel Plan. Many steps have been taken to develop a system that is capable of controlling traffic signals in real time, which means that the time it takes for road signals to change will be determined by the number of vehicles on both sides of the road over time. In our proposed system, a few object recognition algorithms can be used to calculate the number of vehicles on the road.

Our goal is to create a model that represents the current state of traffic and to control and solve traffic problems in a major traffic package. Object acquisition is done using a pre-trained model, which is nothing more than

YOLO (Looks Only Once). CNN (Convolutional Neural Network) is a machine learning algorithm used to train an object model. Various data sets were used to train the object acquisition model. In Object Detection at YOLO, OpenCV is used to remove front and back images and to reduce noise.

Security cameras can be used to take street pictures, which will then be inserted into a previously trained model as input data. Each side of the road will be divided into multiple frames of the same length and width for photographing. Depending on the number of vehicles, the turnaround time will be allocated to both sides of the road. If the number of vehicles in all frames is the same, the system will switch to all sides of the road at a fixed interval. If the number of vehicles in all frames varies according to the limit value, our proposed system changes the traffic signal.

II. LITERATURE SURVEY

The aim or objective of this study, Traffic Prediction for Intelligent Transportation Systems Using Machine Learning, is to improve access to accurate and timely traffic flow information, including traffic signals, collisions, circles, and even traffic congestion, all of which can cause traffic congestion. The driver or rider can make an informed decision if they have previous experience that can be very comparable to estimates about all of the above and many other real-life factors that may affect traffic.

In this study, traffic monitoring in smart cities is usually completely automatic. As a result, for the convenience of the user, verified traffic statistics should be displayed online. There is no single definition of what constitutes a smart city because there are so many different technologies that can be incorporated into a city.

Traffic detection has been determined to be an effective detection method for analyzing traffic conditions in this study. Kalman filter and Gaussian is applied, a method for resolving the intended identification of moving vehicles. To improve visual acuity, augmentation technique was used. The proposed method will significantly reduce audio interference while also allowing car detection in a continuous video frame. The main idea of this study was to find a car in collected images using error detection, without loss, re-examination, or errors.

The object detection function is performed using the Gaussian Mixture Model and the Kalman filter, which involves obtaining video data from the signal and processing it. The input video sample was created by considering both day and night traffic conditions, and their limitations. The inclusion of this study was a stand-alone video of 25 frames per second and a resolution of 640 x 480 pixels. Data was collected from the top of the pedestrian bridge using a vertical camera angle. The location of the blob is labeled on the captured image, which corresponds to what is described as a car. An image found with a blob creates a colorful binding box around it to symbolize the object found, while an image found outside the blob remains unbound. The vehicle identification strategy was evaluated using the Recipient Behavior Analysis.

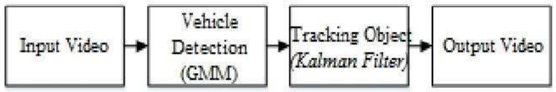


Fig 2.1 Detection and Monitoring of vehicles

In this study, the Traffic Light System proposed the creation of an automated system for controlling road signals and managing their flow using multiple CCTV cameras connected to the Internet. To complete this task, the whole process is divided into two sub-tasks: the Car Detection System and the Traffic Planning Algorithm. Vehicle recognition is done with Digital Image Processing and kernel-based Edge Detection method, in the form of CNN (Convolutional Neural Networks) Machine Learning which is used to classify vehicle types into categories. The editing method is designed and optimized taking into account a few key factors, such as reduced complexity, high performance, and short processing times, without sacrificing accuracy. The system is incredibly reliable, and proved to be useful even when using only 2MP CCTV camera.

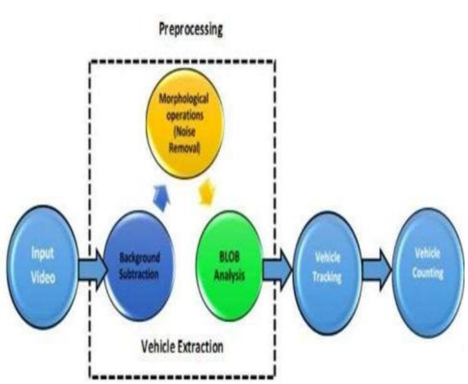


Fig 2.2 Vehicle Monitoring and Counting Process

III. PROBLEM STATEMENT

Its regular As global traffic congestion is increasing and traditional methods of managing it are not enough to run smoothly, a solution that is universally accepted and leads to improved traffic management is needed.

In today's standard mode, the signal changes at normal intervals, but traffic congestion on each signal is not constant, as shown in Fig. 3.1, and the stationary mode fails. In this case, the crowded sidewalk will still be fully occupied if the signal continues to turn at its normal time interval.

As mentioned earlier, the current methods are only designed to collect the number of vehicles in order to conduct traffic comparison comparisons and analysis. If the traffic congestion is too high, the project will run smoothly, making individual management difficult. As a result, our goal is to create a model that reflects real-time traffic and conducts signal changes based on our terms and conditions of the limit value.

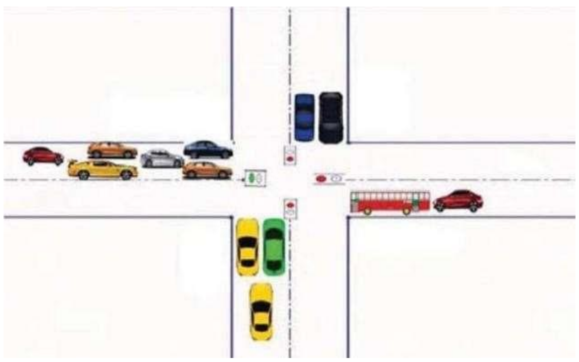


Fig 3.1 Solution for the existing traffic situation

Unlike the other three routes, LANE 1 is full of traffic. Signal switching is usually done clockwise, causing traffic congestion on a particular route. Solve the problem of providing the same time change signal for each route, despite the fact that the number of vehicles on the road varies.

The purpose of our model is to provide a real-time solution to an existing traffic problem by controlling traffic signals. The basic function of the acquisition is performed using a pre-trained model, and the number of vehicles is kept as a result to process additional signal processing applications.

The image will now be transferred to the model to detect and calculate the vehicle.

The whole process of photography and photography will be repeated on all four sides of the road using a single camera. The camera will be connected to a rotating motor (servo motor / stepper motor) that allows it to rotate 360 degrees to take a picture.

After the image has been processed through a filter that specifies the region in terms of length and width, only vehicles in the aforementioned area are detected and calculated statistically. The size of this sinner remains the same during the photography process.

When an object is detected, the OpenCV pulls a rectangular box around it, allowing the user to check if the object identified as a vehicle is indeed a vehicle. The total number of photos taken on both sides of the road is now included. Determine the result by comparing numbers from four different images.

Because traffic on all sides is limited or very crowded with vehicles from all sides, if the output of the four-dimensional image is restricted, a vertical rotation will dig and each symbol will be given the same time of exchange. In addition, the variable signal switching is started when the calculated effect of any signal exceeds the limit value. Traffic congestion on the route determines the turnaround time for dynamic transitions. Because the traffic volume at all lights is not constant, the model is developed with the assumption that the threshold value cannot remain constant. As a result, the model will learn to set the limit value based on how the signal is accumulated after a few cyber cycles.

Fig 4.1 Input for vehicle sensing

Fig 4.2 Output for vehicle sensing

The diagram above shows how the camera captures and selects images, as well as how detection and calculation tasks are performed, all with the goal of doing.

IV. METHODOLOGY

Increased urbanization has led to an increase in traffic congestion, resulting in traffic congestion, traffic violations, and traffic crime offenses, as well as significant barriers to traffic management and control in central and metropolitan areas. CNN (Convolutional Neural Network) algorithm and YOLO techniques used to identify vehicles based on their perception, visibility and monitoring of road signs to control road signals.

Algorithm CNN CNN is a type of neural network representing the Convolutional Neural Network. CNN means significant improvements in image recognition. They are usually used to investigate visual images and are often used after image classification. Image database is full of them. They specialize in image classification, object detection, and image recognition, among other computer vision problems. It can detect useful features in high-resolution data independently, as opposed to shallow networks. CNN is widely used in applications such as remote sensors, ocean visibility, high-resolution data, traffic signal detection, and more. K-NN (k- Close Neighbors) has an important calculation value. If the variable is not done in the normal way, high frequency variations may cause bias. Work in the pre-processing phase too much before hiring k- NN noise reduction. The Naive Bayes class assumes that the presence of one element in a class does not correspond to the presence of any other element. It's fast and easy to set up, and very useful for large data sets. The SVM algorithm presents each data as a point in the n-dimensional space (where n is the number of elements), the value of each function being the value of a specific link.

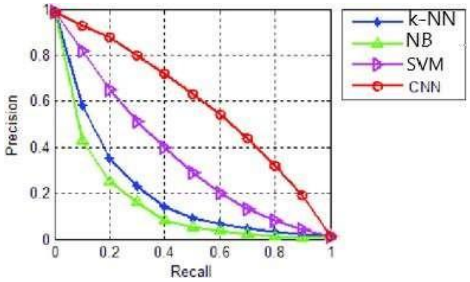
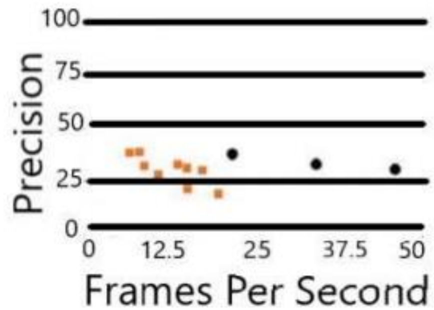


Fig 5.1 Graph of CNN algorithm

YOLO (You Only Look Once) is a network that finds things. It is one of the most accurate models trained in advance. Yolo is a combination of RCNN and SSD producing a fast, very efficient, and powerful algorithm By using Yolo's method of finding an object, you can not only find what is in the picture, but also where the object is. In addition, because the model was trained in large databases, it can view images in any random way, such as objects rotated 360 degrees. YOLO is so good that it can tell the difference between two very similar things. Yolo looks at the picture only once and does it in a clever way, instead of adding a separator to each picture and generating a prediction. It splits the image into an MxM grid and splits it into N-segments. Yolo is currently using its algorithm to predict confidence points in each component. Self-confidence scores indicate whether something exists or not. Yolo uses confidence points to get something. Yolo takes less time to process frame frames than other previously trained algorithms.

Fig 5.2 Time Chart of Yolo Execution



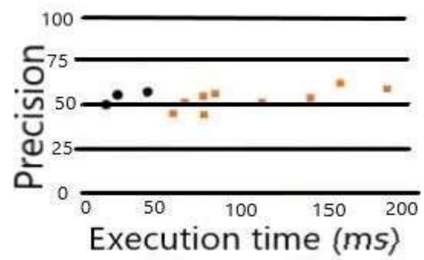


Fig 5.3 Time Chart of Yolo Frames

Yolo can process a larger number of frames in a shorter period of time than other previously trained models. Yolo measures accuracy and remembering forecasts, with accuracy indicating how accurate the predictions are and remembering how well you get all the points, or how well the items are categorized.

Yolo develops its output factor through IoU, or Intersection over Union.. IoU is a metaphor used to measure the accuracy of an object detector in a particular database. Yolo is divided into two parts. R CNN, one of Yolo's components, uses the selected search method to elevate the precise binding box that encloses objects, while the SSD facilitates image processing functionality.

In contrast to other regional proposal

segmentation networks that make discoveries on various regional proposals and thus end up making predictions many times in different regions in the picture, Yolo structures resemble a Transforming Sensitive Network and transmit image as well as output (MxM) prediction. This structure divides the input image into a (MxM) grid.

V. CONCLUSION

This project, which will focus on reducing digital traffic without any additional hardware, the proposed program aims to address the problem of traffic in many urban and rural areas. This model can be used to produce smooth traffic on the road without producing any confusion. The model is designed in such a way that it determines the timing of a smart signal on both sides of the road, ensuring that no one has to wait on the road for long periods of time and for smooth traffic.

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