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Traffic Lights Control In A Smart WayBy Ai With Yolo

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Abstract— **Traffic congestion is becoming one of the critical issues with increasing population and automobiles in cities. Traffic jams not only cause extra delay and stress for the drivers, but also increase fuel consumption and air pollution. 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. The traffic controller is one of the critical factors affecting traffic flow. Therefore, the need for optimizing traffic control to better accommodate this increasing demand arises. paper is utilizing traffic cameras and YOLO object detection algorithms to estimate traffic density at all lanes and then adjust red and green signal time. Cameras will take snapshot of all lanes every five seconds and then estimate traffic at lanes and based on density green and red signal time will be adjusted.**

***Keywords—* YOLO, object detection, cameras, traffic management, Traffic density.**

I. Introduction

With the increasing number of vehicles in urban areas, many road networks are facing problems with the capacity drop of roads and the corresponding Level of Service. Many traffic- related issues occur because of traffic control systems on intersections that use fixed signal timers. They repeat the same phase sequence and its duration with no changes. Increased demand for road capacity also increases the need for new solutions for traffic control that can be found in the field of Intelligent Transport Systems. Let us take the case study of Mumbai and Bangalore. Traffic flow in Bangalore is the worst in the world while Mumbai is close behind in fourth position, according to a report detailing the traffic situation in 416 citiesacross 57 countries. In Bangalore, a journey during rush-hour takes 71% longer. In Mumbai, it is 65% longer [1]. There are three standard methods for traffic control that are being used currently:

Manual Controlling: As the name suggests, it requires manpower to control the traffic. The traffic police are allotted for a required area to control traffic. The traffic police carry signboard, sign light, and whistle to control the traffic.

1) **Conventional traffic lights with static timers**: These are controlled by fixed timers. A constant numerical value is loaded in the timer. The lights are automatically switching to red and green based on the timer value.

2) **Electronic Sensors**: Another advanced method is placing some loop detectors or proximity sensors on the road. This sensor gives data about the traffic on the road. According tothe sensor data, the traffic signals are controlled.

These conventional methods face certain drawbacks. The manual controlling system requires a large amount of manpower. As there is poor strength of traffic police, we cannot have them controlling traffic manually in all areas of a city or town. So a better system to control the traffic is needed. Static traffic controlling uses a traffic light with a timer for every phase, which is fixed and does not adapt according to the real-time traffic on that road. While using electronic sensors i.e., proximity sensors or loop detectors, the accuracy and coverage are often in conflict because the collection of high-quality information is usually based on sophisticated and expensive technologies, and thus limited budget will reduce the number of facilities. Moreover, due to the limited effective range of most sensors, the total coverage on a network of facilities usually requires a lot of sensors.
In recent years, video monitoring and surveillance systems have been extensively used in traffic management for security, ramp metering, and providing information and updates to travelers in real-time. The traffic density estimation and vehicle classification can also be achieved using video

monitoring systems, which can then be used to control the timers of the traffic signals so as to optimize traffic flow and minimize congestion. Our proposed system aims to design a traffic light controller based on Computer Vision that can adapt to the current traffic situation. It uses live images from the CCTV cameras at traffic junctions for real-time traffic density calculation by detecting the number of vehicles at the Signal and setting the green signal time accordingly. The vehicles are classified as a car, bike, bus/truck, or rickshaw to obtain an accurate estimate of the green signal time. It uses YOLO in order to detect the number of vehicles and then set the timer of the traffic signal according to vehicle density in the corresponding direction. This helps to optimize the green signal times, and traffic is cleared at a much faster rate than a static system, thus reducing the unwanted delays, congestion, and waiting time, which in turn will reduce the fuel consumption and pollution.

II. RELATED WORKS

W. L. Ou, M. H. Shih, C. W. Chang, X. H. Yu, C. P. Fan, "Intelligent Video-Based Drowsy Driver Detection System under Various Illuminations and Embedded Software Implementation"

An intelligent video-based drowsy driver detection system, which is unaffected by various illuminations, is developed in this study. Even if a driver wears glasses, the proposed system detects the drowsy conditions effectively. By a near-infrared-ray (NIR) camera, the proposed system is divided into two cascaded computational procedures: the driver eyes detection and the drowsy driver detection. The average open/closed eyes detection rates without/with glasses are 94% and 78%, respectively, and the accuracy of the drowsy status detection is up to 91%. By implementing on the FPGA-based embedded platform, the processing speed with the 640×480 format video is up to 16 frames per second (fps) after software optimizations.

W. B. Horng, C. Y. Chen, Y. Chang, C. H. Fan, "Driver Fatigue Detection based on Eye Tracking and Dynamic Template Matching"

A vision-based real-time driver fatigue detection system is proposed for driving safely. The driver's face is located, from color images captured in a car, by using the characteristic of skin colors. Then, edge detection is used to locate the regions of eyes. In addition to being used as the dynamic templates for eye tracking in the next frame, the obtained eyes' images are also used for fatigue detection in order to generate some warning alarms for driving safety. The system is tested on a Pentium III 550 CPU with 128 MB RAM. The experiment results seem quite encouraging andpromising. The system can reach 20 frames per second for eye tracking, and the average correct rate for eye location and tracking can achieve 99.1% on four test videos. The correct rate for fatigue detection is l00%, but the average precision rate is 88.9% on the test videos.

S. Singh, N. P. Papanikolopoulos, "Monitoring Driver Fatigue using Facial Analysis Techniques"

We describe a non-intrusive vision-based system for the detection of driver fatigue. The system uses a color video camera that points directly towards the driver's face and monitors the driver's eyes order to detect micro-sleeps (short periods of sleep). The system deals with skin-color information in order to search for the face in the input space. After segmenting the pixels with skin like color, we perform blob processing order to determine the exact position of the face. We reduce the search space by analyzing the horizontal gradient map of the face, taking into account the knowledge that eye regions in the face present a great change in the horizontal intensity gradient. In order to find and track the location of the pupil, we use gray scale model matching. We also use the same pattern recognition technique to determine whether the eye is open or closed. If the eyes remain closed for an abnormal period of time (5-6 sec), the system draws the conclusion that the person is falling asleep and issues a warning signal.

Existing System

Manual Controlling: As the name suggests, it requires manpower to control the traffic. The traffic police are allotted for a required area to control traffic. The traffic police carry signboard, a sign light, and whistle to control the traffic.

Conventional traffic lights with static timers: These are controlled by fixed timers. A constant numerical value is loaded in the timer. The lights are automatically switching to red and green based on the timer value.

Electronic Sensors: Another advanced method is placing some loop detectors or proximity sensors on the road. This sensor gives data about the traffic on the road. According to the sensor data, the traffic signals are controlled.

Disadvantages of Existing System

These conventional methods face certain drawbacks. The manual controlling system requires a large amount of manpower. As there is poor strength of traffic police, we cannot have them controlling traffic manually in all areas of a city or town.

So a better system to control the traffic is needed. Static traffic controlling uses a traffic light with a timer for every phase, which is fixed and does not adapt according to the real-time traffic on that road.

III. PROPOSED SYSTEM

Now-a-days due to increasing number of vehicles it"s becoming difficult to manage traffic efficiently which leads to longer duration journey and maximum petrol consumption and to avoid this problem standard techniques was introduce such as manual traffic control which require more number of traffic person, static time traffic control which is not effective as it will use same timer for all lanes with heavy and light traffic

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and sensor based traffic management but this require heavy budget of sensor deployment to sense and manage traffic based on density.

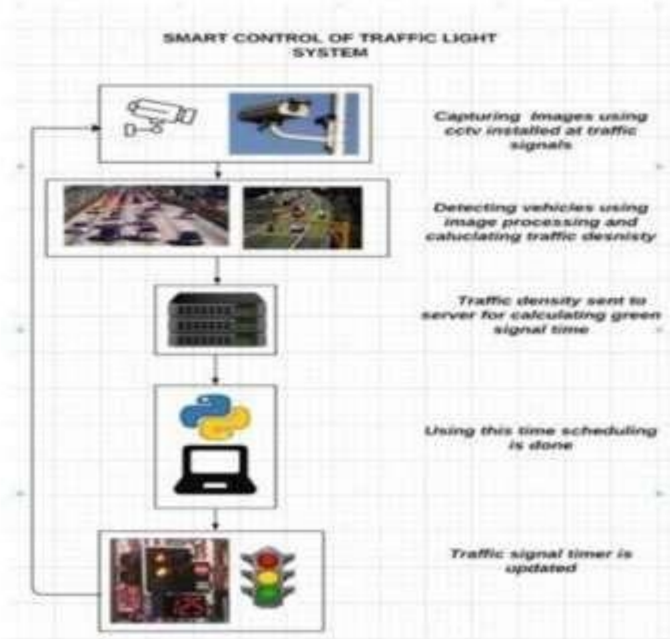

Fig.1 Architecture of proposed system

Run Traffic Simulation:

Using this module we can start PYGAME traffic simulation where you can see traffic.
control based on traffic density.

Run Yolo Traffic Detection & Counting:

Using this module we will upload traffic videos and then YOLO will detect traffic vehicles and estimate their density with speed.

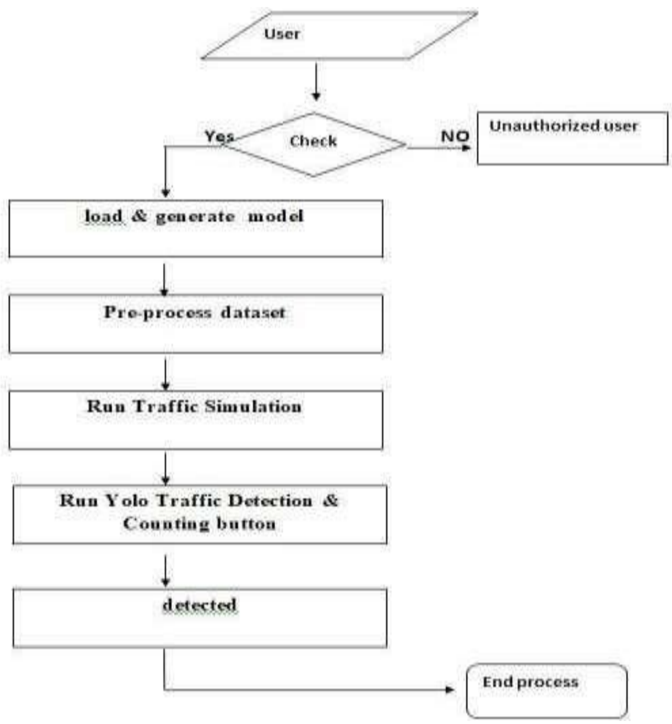

Fig.2 data Flow Diagram

To overcome from above issues author of this paper is utilizing traffic cameras and YOLO object detection algorithms to estimate traffic density at all lanes and then adjust red and green signal time. Cameras will take snapshot of all lanes every five seconds and then estimate traffic at lanes and based on density green and red signal time will be adjusted.

Advantages of proposed system are

(1) It will give better accuracy
(2) It reduces the waiting time
(3) Better prediction
(4) Reducing the pollution

IV. RESULTS AND DISCUSSION

The results obtained after running the project code are shown from Fig.3 to Fig.10.

Fig.3 Running the project

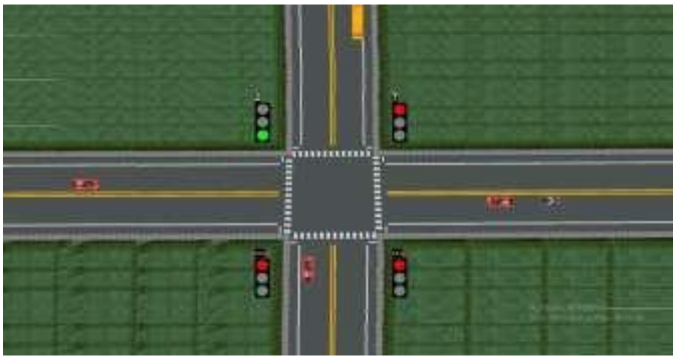

Fig.4 Lane detection1

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Fig.5 Lane detection-2

Fig.6 Homepage

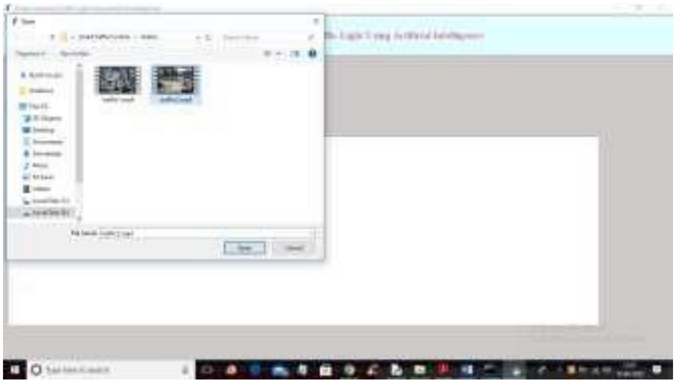

Fig.7. Upload image

Fig.8 Detected vehicles-1

Fig.9 Detected vehicles-2

Fig.10 Detected vehicles-3

V. CONCLUSION

In conclusion, the proposed system sets the green signal time adaptively according to the traffic density at the signal and ensures that the direction with more traffic is allotted a green signal for a longer duration of time as compared to the direction with lesser traffic. This will lower the unwanted delays and reduce congestion and waiting time, which in turn will reduce fuel consumption and pollution. According to simulation results, the system shows about 23% improvement over the current system in terms of the number of vehicles crossing the intersection, which is a significant improvement. With further calibration using reallife CCTV data for training the model, this system can be improved to perform even better. Moreover, the proposed system possesses certain advantages over the existing intelligent traffic control systems prevalent such as Pressure Mats and Infrared Sensors. The cost required to deploy the system is negligible as footage from CCTV cameras from traffic signals is used, which requires no additional hardware in most cases, as intersections with heavy traffic are already equipped with such cameras. Only minor alignment may need to be performed. The maintenance cost also goes down as compared to other traffic monitoring systems such as pressure mats that normally suffer wear and tear due to their placement on roads where they are subjected to immense pressure constantly. Thus, the proposed system can thus be integrated with the CCTV cameras in major cities in order to facilitate better management of traffic.

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