Detection of Vehicles and Speed Tracking System

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ABSTRACT—Intelligent vehicle detection is becoming increasingly important in the field of highway management. However, due to the different sizes of vehicles, their detection remains a challenge that directly affects the accuracy of vehicle counts. To address this issue, this project proposes a vision-based vehicle detection and speed Tracking. A new high-definition highway vehicle dataset with a total of 57,290 annotated instances in 11,129 images is published in this study. Compared with the existing public datasets, the proposed dataset contains annotated tiny objects in the image, which provides the complete data foundation for vehicle detection based on deep learning. In the proposed vehicle detection and detection system, the highway road surface in the image is first extracted and divided into a remote area and a proximal area by a newly proposed segmentation method; the method is crucial for improving vehicle detection. Then, the above two areas are placed into the YOLOv3 network to detect the type and location of the vehicle. Finally, the vehicle trajectories are obtained by the ORB algorithm, which can be used to judge the driving direction of the vehicle and obtain the number of different vehicles. Several highway surveillance videos based on different scenes are used to verify the proposed methods. The experimental results verify that using the proposed segmentation method can provide higher detection accuracy, especially for the detection of small vehicle objects. Moreover, the novel strategy described in this article performs notably well in judging driving direction and detection of vehicle. This project has general practical significance for the management and control of highway scenes..

Keywords—Vehicle, speed detection, Yolo, datasets..

I. INTRODUCTION

Vehicle detection and statistics in highway monitoring video scenes are of considerable significance to intelligent traffic management and control of the highway. With the popular installation of traffic surveillance cameras, a vast database of traffic video footage has been obtained for analysis. Generally, at a high viewing angle, a more-distant road surface can be considered. The object size of the vehicle changes greatly at this viewing angle, and the detection accuracy of a small object far away from the road is low. In the face of complex camera scenes, it is essential to effectively solve the above problems and further apply them. In this article, we focus on the above issues to propose a viable solution, and we apply the vehicle detection results to multi-object tracking and vehicle detection

A. Background History

The traditional machine vision method has a faster speed when detecting the vehicle but does not produce a good result when the image changes in brightness, there is periodic motion in the background, and where there are slow moving vehicles or complex scenes. Advanced CNN has achieved good results in object detection; however, CNN is sensitive to scale changes in object detection. The one stage method uses grids to predict objects, and the grid's spatial constraints make it impossible to have higher precision with the two-stage approach, especially for small objects. The two-stage method uses region of interest pooling to segment candidate regions into blocks according to given parameters, and if the candidate region is smaller than the size of the given parameters, the candidate region is padded to the size of the given parameters. In this way, the characteristic structure of a small object is destroyed, and its detection accuracy is low. The existing methods do not distinguish if large and small objects belong to the same category. The same method is used to deal with

the same type of object, which will also lead to inaccurate detection. The use of image pyramids or multi-scale input images can solve the above problems, although the calculation requirements are large.

B.   Problem Statement

Vehicle tracking is the process of locating a moving vehicle using a camera. Capture vehicle in video sequence from surveillance camera is demanding application to improve tracking performance. This technology is increasing the number of applications such as traffic control, traffic monitoring, traffic flow, security etc. The estimated cost using this technology will be very less. Video and image processing has been used for traffic surveillance, analysis and monitoring of traffic conditions in many cities and urban areas. Various methods for speed estimation are proposed in recent years. All approaches attempt to increase accuracy and decrease cost of hardware implementation. The aim is to build an automatic system that can accurately localize and track the speed of anyvehicle that appear in aerial video frames.

C.   Applications

Video detection is based on real-time image processing providing efficient wide-area detection well suited for registration of incidents on roads and in tunnels. Connected to Traffic Controllers, the application can also be used for vehicle detection at signalized intersections where it is difficult or expensive to install inductive loops. Video-detection systems are also considered nonintrusive. Video detection combines real-time image processing and computerized pattern recognition in a flexible platform; it uses a vision processor to analyses real-time changes in the image.

D.   Scope
1.To develop application for detecting the vehicle.
2.To develop application for detecting the velocity of a moving vehicle.
3.To develop the application cost effectively and user-friendly.
4.Design a speed detection system for the use in speed track system for the purpose of traffic speed law enforcement.

II. LITERATURE SURVEY

Review of literature is important in any research work. Many researchers have carried out research work in the area of medication reminding and health monitoring. Some of them have analyzed the data in different ways.

Viral Doshi,   "An IOT Based Smart medication Box"[1].,The System is IOT based smart medicine dispenser. Each patient will be provided with a unique RFID tag which will have its unique 12 digit code. Corresponding to the RFID tag code, the patient name, the total dosage was taken and the total dosage missed if any, in one month will be updated in the database. This database will be created using IOT. This database will be real-time and updated as soon as the medication is taken or missed. The RFID reader will be placed inside the medicine dispenser.

Samir V.Zanjala, Girish. R. Talmale, "Medicine Reminder and Monitoring System for Secure Health Using IOT"[2].,Generally for home based health care the arrangement include communications, imaging, sensing and human computer interaction technologies embattled at diagnosis, treatment and monitoring patients without disturbing the quality of lifestyle. It can be possible the development of a low cost medical sensing, communication and analytics device that is real-time monitoring internet allowed patients physical conditions. Internet of Things (IoT) network will provide active and real-time appointment of patient, caretaker and doctors, from source point to destination for the purpose of remote monitoring system.

Aswin KumarS, S.Kanakaraja, L.S.PSairamNadipalli, Punya Teja Harini Sree, Tejaswni, "Smart monitoring and Speaking medication reminder"[3].,The speaking medication reminder reminds the patients to take medicine in prior time. It initially permits patients to enter reminder inputs. The device at that point reminds the patients to take medication in prior time and perfect amount of dosage using raspberry pi. The framework on set time converts the text to speech and then delivers the message to the patient by taking need from a speaker. And the device then reminds the patient at the fed time intervals which are already provided as input

Nada Sahlab, Nasser Jazdi, Michael Weyrich,Peter Schmid, "Development of an Intelligent Pill Dispenser Based on an IoT-Approach"[4].,The stationary pill dispenser manages pill boxes, timely and automatically dispenses pills and detects pill intake. It has a multimodal user interface and communicates with the cloud server to retrieve and update data. The mobile pill dispenser manages one exchangeable daily pill box and detects pill intake via box opening. It generates alarms and communicates with the app via Bluetooth. Exchanged data include box opening times and reminder settings. The mobile app scans the medication plan via its QR-code and automatically generates pill filling instructions and alarms for caregivers or users. Furthermore, the app allows the user to overview his medication and set his personalized alarms through

preferred interfaces. It also exchanges and synchronizes data with the cloud server.

S Kiruthiga, B. Arunthadhi, R. Deepthyvarma, V. R. Divya Shree, "Iot Based Medication Monitoring System for Independently Living Patient"[5].,The main reason behind the proposed design is to provide a user friendly interface for independently living people to use this gadget as a reminder alert for taking their medicines daily on mean time. The information regarding the medications intake can be send through the mobile app, so that the caretaker can track the patient condition from anywhere, The information about the medications status gets notified in caretaker smartphone by connecting the device to Wi-Fi. The patient intake time of medications along with pulse readings are stored in open source storage called as MySQL where the information from the medication system is stored in website where a special id created for individual persons for usage. The caretaker and doctor can refer the details of medication intake timing and pulse readings with time notification which can be used for future references.

III. EXISTING AND PROPOSED SYSTEM

A. Existing System

LiDAR and RADAR are both remote sensing devices that are often used for the detection, tracking, and imaging of various objects. Both sensors have assisted measurement in a Vehicle Detection. While they're used across a broad range of industries, LiDAR and RADAR are stirring up a buzz for their functionality in Vehicle Detection. the system that enables object detection in autonomous vehicles includes a variety of sensing devices connected through a LiDAR, RADAR, ultrasonic sensors.

LiDAR stands for light detection and ranging or laser imaging, detection, and ranging. While it's a new concept compared to RADAR, it's been around since the discovery of lasers in the 1960s.There are two types of LiDAR sensing devices, airborne- and ground-based.

Ground-based LiDAR uses lasers with a wavelength of 500 - 600 nm and is used in various applications, such as landslide studies or obstacle detection in autonomous vehicles. Airborne-based LiDAR, on the other hand, uses lasers with a wavelength of 1000 - 1600 nm and mostly used to collect terrain data. LiDAR systems are dependable because they're capable of measuring an environment with high accuracy and producing a 3D image based on the results.

RADAR

RADAR stands for Radio Detection and Ranging. Just as its name suggests, RADAR's working principle is almost identical to LiDAR, except it uses radio waves instead of lasers or light. Radio waves have a much longer wavelength compared to light waves, making radars able to cover longer distances compared to LiDAR devices. The frequency and type of radio waves used depend on the requirement of your measurement device..

B. Limitation of Existing System
- For many years, LiDAR sensors are not an option for most manufacturers because its high cost.
- A high-end automotive LiDAR by Teledyne used to cost $75,000
- While RADAR's accuracy leaves much to be desired, it's much more reliable than LiDAR.
- LiDAR uses light waves as a medium and is easily affected by the medium itself. For example, moisture in the atmosphere affects the performance of a LiDAR system. LiDAR systems don't perform as well in bad weather, such as in the rain, fog, or snowstorm.

C. Proposed System
By Computer vision Without any hardware:

Image acquisition in image processing can be broadly defined as the action of retrieving an image from some source, usually a hardware-based source, so it can be passed through whatever processes need to occur afterward. Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, no processing is possible. One of the ultimate goals of image acquisition in image processing is to have a source of input that operates within such controlled and measured guidelines that the same image can, if necessary, be nearly perfectly reproduced under the same conditions so anomalous factors are easier to locate and eliminate. Edges are those places in an image that correspond to object boundaries. Edges are pixels were image brightness changes abruptly. An edge is a property attached to an individual pixel and is calculated from the image function behaviour in a neighbourhood of the pixel. It is a vector variable (magnitude of the gradient, direction of an edge).

Advantages of Proposed system
- .Determining the most suitable features (HOG, image colour histogram, etc.)
- Exploring the combination of HOG parameters + colour spaces
- Applying grid search to find the most suitable classifier.
- Determining correct position of our sliding windows and the overlap

- Identifying suitable threshold for overlapping detection
- Adopting suitable frame sampling rate
- Finding a good enough minimum detection count over multiple frames
- Aggregating the combined window dimensions for overlapping detectionsPrescribed timings alarms.
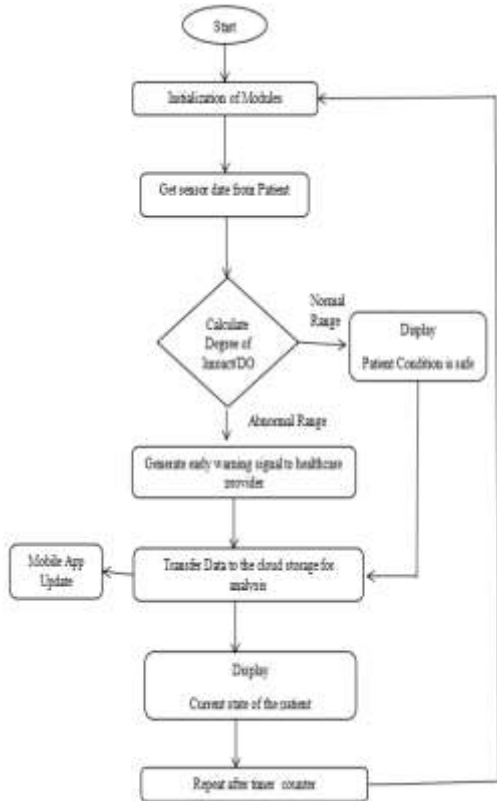
D.   Flow Chart for Vehicle detection
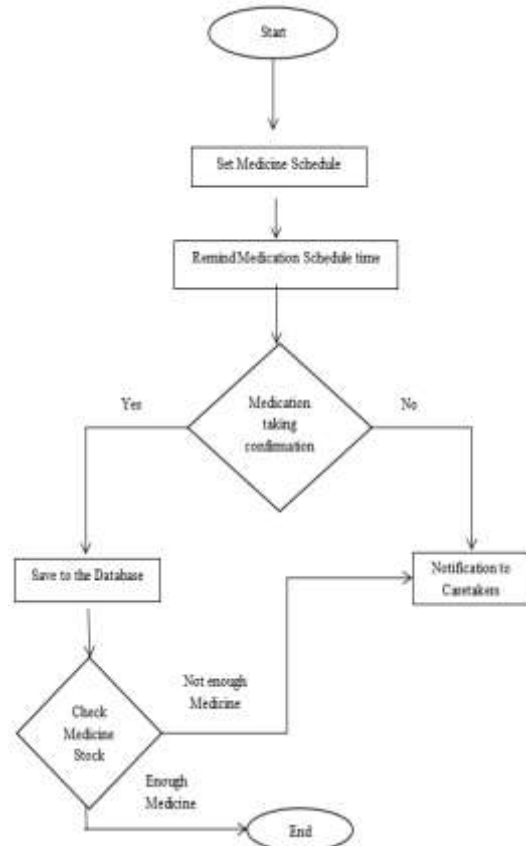

Figure 1.0

E.   Flow Chart for Medication Reminding

Figure 1.1

IV.   SYSTEM SPECIFICATION
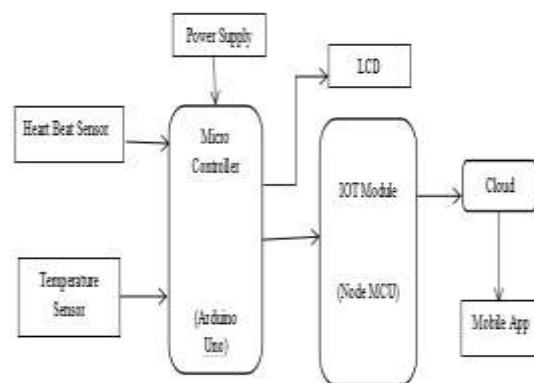
A.   Block Diagram for Health Monitoring

Figure 1.2

The temperature sensor and heartbeat sensor continuously monitor the patients health condition and updates are sent using mobile app to the concerned people. Based on received data timely action can be taken during emergency situation as shown in above figure 1.2.
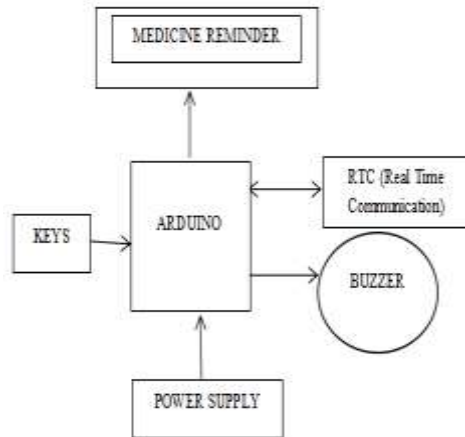
B. Block Diagram for Medication Reminding

Figure 1.3

Sometimes patients forget to take the medicine at the required time of medicines. And sometimes patient also forgets which medicine they have to take at required time. And it is difficult for Doctor to monitor patients around the clock. To avoid this problem, we have made this medicine reminder system for patients using Arduino, Buzzer, RTC as shown in above figure 1.3.

POWER SUPPLY
Block diagram
The ac voltage, typically 220V rms, is connected to a transformer, which steps that ac voltage down to the level of the desired dc output. A diode rectifier then provides a full-wave rectified voltage that is initially filtered by a simple capacitor filter to produce a dc voltage. This resulting dc voltage usually has some ripple or ac voltage variation. A regulator circuit removes the ripples and also remains the same dc value even if the input dc voltage varies, or the load connected to the output dc voltage changes. This voltage regulation is usually obtained using one of the popular voltage regulator IC units which is shown in the figure 1.4.

Figure 1.4

V. CONCLUSION AND FUTURE WORK
A. Conclusion

An object tracker–detector combined with an object tracking algorithm was proposed for tracking vehicles in traffic scenes. For object detection, a detection box merge strategy was used to prevent YOLO from detecting an object more than once or partially detecting an object. For the tracker design, a deep feature-based CF tracker was designed, and for tracker–detector integration, a tracker was first used to predict the location of an object in the subsequent frame. The tracking quality was evaluated based on the PSR. For trackers with relatively poor tracking quality or that have failed to match with the observed values in multiple consecutive frames, a spatial location constraint was applied to correct the predicted locations. Objects that failed to be tracked due to blocking were retracted based on the correlations between the spatial location, moving direction, and historical features. Through experiments, the proposed metaobject tracking algorithm was found to be capable of steadily and continuously tracking objects in traffic scenes and retracking blocked objects.

Future Work
We can expand the data flow by parallel pipelining. This makes the model to alter it with the upcoming new data. We can cluster data into parts using Apache Hadoop (for large chunks of data) and process it parallelly. This can be further deployed into cloud for real-time learning. We can also fuse Deep learning models together for a better performance and wide area of deployment. By these we can be able to achieve a hybrid model which learns when there is a change is field of data

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