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Intelligent Traffic Management System

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Abstract - Existing Traffic Management system works quite satisfactorily with moderate density of traffic but gets chaotic as the vehicle crowd increases. The system would be provided with image inputs of different traffic scenes. Based on the parameters predefined, it will segregate the scenes thus provides traffic as low, moderate or heavy traffic considering traffic density as the major parameter.The data understanding phase consists of various road traffic-scenes with High, Moderate and Low Traffic density which will thus enable us to create a training dataset. This dataset would help us train our TDIM (Traffic Density Identification Module) further and thus make it capable of identifying and segregating the Traffic scene accordingly.

***Key Words*: Traffic Management System; Traffic Density; Traffic Density Identification Module; Dataset; Low; Moderate; High.**

1. INTRODUCTION

1.1Current State of Road-Traffic Management

Road Traffic management makes use of static signals for driving the flow of traffic across the country. Traffic signal consist of three values differentiated based on colours, RED for Stop, YELLOW for Get Ready and GREEN for Go. All these are varied based on a control system which consists of a timer cycle to alter the same. The timer cycle's value depends on the number of lanes. It carries out a timer rotation cycle of generalized value i.e. 120s timer where for 26s the proposed system has a GREEN signal and for the rest 116s RED signal which works in a well arranged simultaneous mathematical module. The remaining 8s skip is for the YELLOW signal time which acts as a sublayer between the two systems to provide smooth functionality.

1.2 Solution by Providing a Dynamic Approach

The proposed system would provide an intelligent solution for the same and thus enable the current static system to adapt with the environment, identify traffic density and thus manage it with greater accuracy and less chaos. The system will isolate traffic image as an individual input entity in which it will process the image, check whether it fulfils the standards for pushing it further to the TDIM (Traffic Density Identification Module) which works on two modes namely, Default and Special Mode.
Firstly in Default mode, the module sets up the parameter isolation and considers the traffic entity as one of the three predefined classes, Low Traffic Density, Moderate Traffic Density, High Traffic Density. Accordingly it will alter the timer for Low and High Density and provide a dynamic environment to the traffic management system. It will occur in cycles with a 20s delay. Now in Special mode, the proposed system isolates a single vehicle from the entire traffic image and once identified as an emergency vehicle, it simply gives highest priority to the same, giving GREEN light to the particular lane and thus making all other sides STOP. It will occur in 10cyclletill the vehicle passes and once it does, resumes the default system and retraces to the TDIM (Traffic Density Identification Module).

2. LITERATURE REVIEW

Neural Network techniques have been used over the years and hence there are many systems implemented in this field. The chapter contains a literature survey of some papers which are related to the proposed system. Furthermore, the chapter contains an analysis table for all the papers discussed in the literature survey.

A. Khan, et. al.[2015] have proposed a system is developed to control and monitor the congestion of traffic. The main motivation is to detect the presence and absence of vehicles on the road using statistical approach integrated with conventional image processing techniques. For this purpose, they have developed a "Probability Based Vehicle Detection (PBVD)" algorithm based Vehicle Detection System (VDS) integrated with post - processing subsystems to form a complete traffic control system. The system has the capability to obtain vehicle statistics during controlling traffic. Simulations are performed by developing complete prototype traffic architecture. Comparison is done using the result acquired from prototyp 4 system and processing a real time video of traffic scene. Simulation results show the effectiveness of the proposed scheme.

Shreyas, et. al. [2017] have proposed Automatic Number Plate Recognition (ANPR) System is based on an image processing technology. The proposed system can be mainly used to monitor road traffic activities such as the identification of vehicles during traffic violations such as speed of vehicle and to detect at the street traffic signals lane violation. And thereby can be traced every vehicle for traffic rule violation and can provide the information to the concerned authority to take further effective action. The proposed system first detects any vehicle which

violates traffic rules and then captures the vehicle image. From the captured image using image segmentation technique the vehicle number plate region will be extracted. And the technique used for character recognition on number plates is Optical character recognition. The system is implemented and simulated using MATLAB.

Z. Shao, et. al. [2015] have proposed in this paper the recognition framework of car makes and models from a single image captured by a traffic camera. Due to various configurations of traffic cameras, a traffic image may be captured in different viewpoints and lighting conditions, and the image quality varies in resolution and color depth. In the framework, cars are first detected using a part-based detector, and license plates and headlamps are detected as cardinal anchor points to rectify projective distortion. Car features are extracted, normalized, and classified using an ensemble of neural-network classifiers. In the experiment, the performance of the proposed method is evaluated on a data set of practical traffic images. The results prove the effectiveness of the proposed method in vehicle detection and model recognition.

Y. Lin, et. al. [2018] have a Proposed system used convolutional neural network on Keras with Tensorflow support the experimental results shows the time required to train, test and create the model in a limited computing system. The system is trained with 60,000 images with 25 epochs each epoch is taking 722 to 760 seconds in training step on Tensorflow cpu system. At the end of 25 epochs the training accuracy is 96 percent and the system can recognize 7 input images based on the train model and the output is the respective label of images. We chose to utilize 60,000 pictures with a 32x32 pixel measure CIFAR-10 database. Python and TensorFlow have been utilized for the program. They chose to utilize 60,000 pictures with a 32x32 pixel measure CIFAR-10 database.

3. PROBLEM DEFINITION

People generally face the problem of green light going off soon in heavy traffic[1]. This problem can be contained by making the traffic management system capable of determining the density of traffic and being able to alter its timer accordingly. This will reduce chaos and the traffic would hence be managed well, making the system smarter[7]. Previous System for traffic management was based on a statistical probabilistic model which wasn't that accurate. Another system made use of the "Feed Forward Neural Network-Artificial Neuron" along with "Support Vector Machine-SVM classifier" algorithms for identifying vehicle's makes and models.

Also many times, emergency vehicles don't get a way to move quickly, if there is heavy traffic. ITMS will identify the emergency vehicles and will give priority to that lane. In highly populated nations like India and China, the GDP is increasing rapidly and hence more people are able to buy vehicles, which clearly illustrates that in the coming future the density of vehicles will increase more rapidly. For this reason ITMS is the best way of clearing the traffic by saving the extra time from green signal which is active unnecessarily even when there is no vehicles on the road and will allocate this time dynamically to the lane having more vehicles.

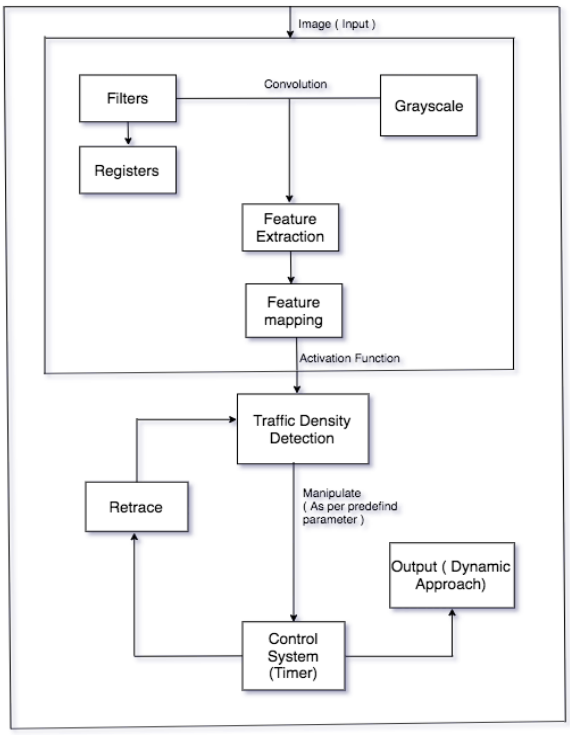
4. SYSTEM ARCHITECTURE

The system mainly focuses on two major problems

1. Uneven Frequency of Traffic vehicles.
2. Static timers of existing Traffic Signals.

The system will be trained using Deep Learning concepts to adapt and recognize density of traffic around and further manage it. Implemented system uses the "Mask R-CNN" algorithm for deep immersion into the scene for effectively isolating the number of vehicles in heterogeneous traffic.

For more accuracy, the system will be using "Back Propagation Technique" for adjusting the existing matrix with a weight-bias of its own. It is also observed that in the existing static system the timers of traffic signals are varied according to road-scope i.e. 2-lane or 3-lane roads, the implemented system would hence fix parameters for the same.



5. IMPLEMENTATION OF THE SYSTEM

Pycharm editor is used.Various libraries like tkinter, threading, os, random, time are used.

Firstly, tkinter window was created.The icon and title for the window was set. Than canvas was created. Inside the canvas the initial design was developed, such as roads, green space, various buildings, trees, etc. The number of vehicles on each lane are selected randomly. After the selection of number of vehicles, difference vehicle images are selected from a predefined list. For reach lane there are different list of vehicles. From each list different vehicles are selected using random library. Time module is used in moving of vehicles and also counting of signal timing. Each lane is sync with opposite signals. The signal's clock differ every time depending upon the number of vehicles on each lane. The vehicles are allowed to move in clockwise fashion. When the vehicles start moving, the signal function is called using threading library so that moving vehicles and signals can work simultaneously. This cycle is repeated using a while loop. If any emergency vehicles are detected, like ambulance, than priority function is called and the lane containing the ambulance gets the priority even if it's not the turn of that lane. When an ambulance is detected, the blue signal gets activated and it toggles between blue and fuchsia till ambulance passes. Once the ambulance has passed, the priority function is deactivated and normal mode is activated. These functions are repeated using while loop. There is a start and stop button for starting and stopping the working of GUI.

Once the start button is clicked, the GUI starts and the mp3 file of traffic sound is played using the OS library.

6. RESULTS

Figure 6.1

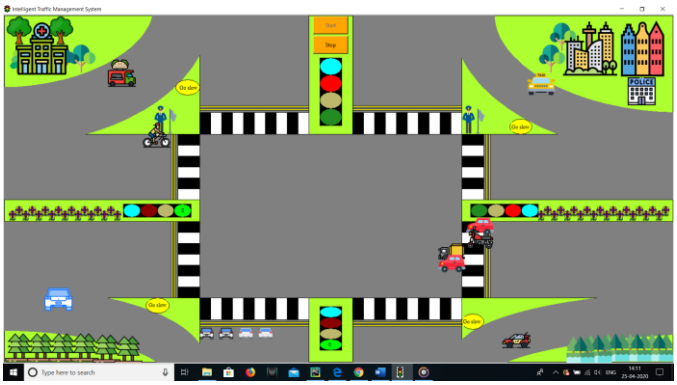


Figure 6.2

7. CONCLUSION

The design of ITMS will be useful in implementing the modules. An intelligent transportation system (ITS) is an advanced application which aims to provide an innovative way of managing different modes of transport and traffic management and enable smooth flow of traffic, more coordinated, and 'smarter' use of transport networks for emergency vehicles.

8. REFERENCES

[1] UrRehman, Yasar Abbas, Adam Khan and Muhammad Tariq. "Modeling, design and analysis of intelligent traffic control system based on integrated statistical image processing techniques." Applied Sciences and Technology (IBCAST), 2015 12th International Bhurban Conference on. IEEE, 2015.

[2] Shreyas. R., et al. "Dynamic traffic rule violation monitoring system using automatic number plate recognition with SMS feedback." Telecommunication and Networks (TEL-NET), 2017 2nd International Conference on. IEEE, 2017.

[3] He, Hongsheng, Zhenzhou Shao and Jindong Tan. "Recognition of car makes and models from a single traffic-camera image." IEEE Transactions on Intelligent Transportation Systems 16.6 (2015) hj: 3182-3192.

[4] Chung, Jiyong and Keemin Sohn. "Image-Based Learning to Measure Traffic Density Using a Deep Convolutional Neural Network." IEEE Transactions on Intelligent Transportation Systems 19.5 2018, pp. 1670-1675.

[5] Mittal, Deepak, et. al. "Training a deep learning architecture for vehicle detection using limited heterogeneous traffic data." Communication Systems & Networks (COMSNETS), 2018 10th International

Conference on. IEEE, 2018.

[6] Gu, Xiao-Feng, et al. "Real-Time vehicle detection and tracking using deep neural networks." Wavelet Active Media Technology and Information Processing (ICCWAMTIP), 2016 13th International Computer Conference on. IEEE, 2016.

[7] Daigavane, P. M., Preeti R. Bajaj and M. B. Daigavane. "Vehicle detection and neural network application for vehicle classification." 2011 International Conference on Computational Intelligence and Communication Systems. IEEE, 2011.

[8] Sotheany, Nou, and Chaiwat Nuthong, "Vehicle classification using neural network." Electrical Engineering/Electronics, Computer, Telecommunications and Information Technology (ECTI-CON), 2017 14th International Conference on. IEEE, 2017.

[9] Dollár, Kaiming He Georgia Gkioxari Piotr and Ross Girshick, "Mask R-CNN." 20

[10] Shi, Honghui, et. al. "Effective object detection from traffic camera videos." 2017 IEEE SmartWorld, Ubiquitous Intelligence & Computing, Advanced & Trusted Computed, Scalable Computing & Communications, Cloud & Big Data Computing, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/CBDCom/IOP /SCI). IEEE, 2017.

[11] Lin, Cheng-Hung, Yong-Sin Lin, and Wei-Chen Liu, "An efficient license plate recognition system using convolution neural networks." 2018 IEEE International ConferenceonApplieSystenInvention(ICASI).IEEE, 2018

[12] Soin, Akhil, and Manisha Chahande. "Moving vehicle detection using deep neural network." Emerging Trends in Computing and Communication Technologies (ICETCCT), International Conference on. IEEE, 2017.