Vehicle Tracking and Speed Estimation

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***Abstract*--In recent times, there has been a drastic change in people's lifestyles and with an increase in incomes and lower cost of automobiles there is a huge increment in the number of cars on the roads which has led to traffic and commotion. The manual efforts to keep people from breaking traffic rules such as the speed limit are not enough. There is not enough police and man force available to track the traffic and vehicles on roads and check them for speed control. Hence, we require technologically advanced speed calculators installed that effectively detect cars on the road and calculate their speeds.**

To implement the above idea two basic requirements, need to be met which are the effective detection of the cars on roads and their velocity measurement. For this purpose, we can use OpenCV software which uses the Haar cascade to train our machine to detect the object, in this case the car.

we have developed a Haar cascade to detect cars on the roads, whose velocities are then measured using a python script. The real-time application of this project proves to be much useful as it is easy to implement, fast to process and efficient with low cost development. Also, the tool might be useful to apply in simulation tools to measure velocities of cars. This can be further developed to identify all kinds of vehicles as well as to check anyone who breaks a traffic light.

The improvements in the project can be done by creating a bigger haar cascade since bigger the haar cascade developed, more the number of vehicles that can be detected on the roads. Better search algorithms can allow a faster search and better detection of these vehicles for better efficiency.

***Keywords* – Tracking, Vehicles, Speed, Estimation.**

I. INTRODUCTION

With the expansion in metropolitan populace in numerous urban areas, measures of vehicles have likewise been radically expanded. In a new report over-speeding caused the greater part of the mishaps, trailed by smashed driving. Over-speeding of bikes and three wheelers is one of the significant reasons of mishaps. To help traffic the board framework in our country we need to construct efficient traffic checking frameworks. As of late picture and video handling has been applied to the field of traffic the executives framework. This paper expressly focuses on the speed of the vehicles, which is one of the significant boundaries to make streets safe. Moderately couple of endeavors have been endeavored to gauge speed by utilizing video pictures from uncalibrated cameras. Also, a few different papers recommend assessing speed by first setting two location lines (isolated by a known distance) and afterward estimating travel times between the lines. This paper gives a minimal expense and flexible vehicle speed recognition utilizing a PC vision based methodology. In this setting, the speed is recognized utilizing camcorders usually accessible.

II. LITERATURE SURVEY

Vehicle speed detection in video image sequences using CVS method. Video and image processing has been used for traffic surveillance, analysis and monitoring of traffic conditions in many cities and urban areas. This paper aims to present another approach to estimate the vehicles velocity. In this study, the captured traffic movies are collected with a stationary camera which is mounted on a freeway. The camera was calibrated based on geometrical equations that were supported directly by using references. Camera calibration for exact measurements may be possible while accurate speed estimation can still be quite difficult to achieve. The designed system has the ability to be extended to another related traffic application. The average error of the detected vehicle speed was ± 7 km/h and the experiment was operated at different resolutions and different video sequences. Image Processing in Road Traffic Analysis, Nonlinear Analysis: Modelling and Control

Atkočiūnas, Erikas et al. The article presents an application of computer vision methods to traffic flow monitoring and road traffic analysis. The application is utilizing image-processing and pattern recognition methods designed and modified to the needs and constrains of road traffic analysis. These methods combined together gives functional capabilities of the system to monitor the road, to initiate automated vehicle tracking, to measure the speed, and to recognize number plates of a car. Software developed was applied in and approved with video monitoring system, based on standard CCTV cameras connected to wide area network computers.

Moving Vehicle Detection and Speed Measurement in Video Sequence

Bhagyashri Makwana et al. Video and image processing has been used for traffic surveillance, analysis and monitoring of traffic conditions in many cities and urban areas.[5] This paper aims to present another approach to estimate the vehicles velocity. This work requires a video scene, comprising the following components: moving vehicle starting reference point and end point of reference. A chip dedicated digital signal processing techniques used to exploit image processing computationally more economical video sequence captured by the video camera fixed position to estimate the speed of moving vehicles are moving vehicles detected by analyzing the sequences of binary images which are constructed from the captured frames by employing the difference in interface or background subtraction algorithm. The

system is designed to detect the position of the moving vehicle at the scene and the position of the reference points and calculate the speed of each frame of the static image detected positions[1].

III. EXISTING SYSTEM

One of the innovations our law authorization office uses to gauge the speed of a moving vehicle is Doppler radar. It radiates a radio wave at a vehicle, and afterward gauge the vehicles speed by estimating change in reflected wave recurrence. It is a fixed or hand-held gadget and is dependable when a moving item is in the field of view and no other moving articles are close by. Cosine mistake must be taken consideration if the firearm isn't in the view. Additionally Radio obstruction which causes mistakes in speed discovery must be taken consideration.

With the expansion in metropolitan populace in numerous urban communities, measures of vehicles have additionally been radically expanded. In a new report over-speeding caused the majority of the mishaps, trailed by tanked driving. Over-speeding of bikes and three wheelers is one of the significant reasons of mishaps. To help traffic the executives framework in our country we need to fabricate conservative traffic checking frameworks. Lately picture and video handling has been applied to the field of traffic the executives framework. This paper unequivocally focuses on the speed of the vehicles, which is one of the significant boundaries to make streets safe

IV.PROPOSED SYSTEM

The manual endeavors to hold individuals back from disrupting traffic norms, for example, as far as possible are sufficiently not. There isn't sufficient police and man power accessible to follow the traffic and vehicles on streets and actually look at them for speed control. Subsequently, we require mechanically progressed speed adding machines introduced that viably distinguish vehicles out and about and ascertain their velocities.

To execute the above thought two essential necessities, should be met which are the compelling identification of the vehicles on streets and their speed estimation. For this reason, we can utilize OpenCV programming which utilizes the Haar course to prepare our machine to recognize the article, for this situation the vehicle.
Upload Image, Train Dataset, Upload Test & Classify

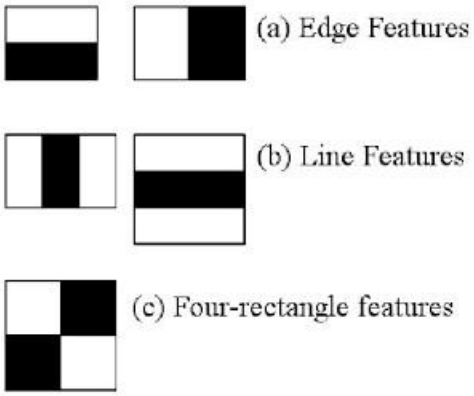
V. MODULES DESCRIPTION

Upload Image: we apply each component on all the preparation pictures. For each component, it finds the best limit which will characterize the countenances to positive and negative. Be that as it may, clearly, there will be blunders or misclassifications. We select the elements with least mistake rate, which implies they are the elements that best orders the auto and non-auto pictures. So now you take a picture. Take each 24x24 window. Apply 6000 elements to it. Check on the off chance that it is auto or not.

Train Dataset: Now every single conceivable size and areas of every part is utilized to ascertain a lot of components. (Simply envision what amount of calculation it needs? Indeed, even a 24x24 window comes about more than 160000

Upload Test & Classify: This velocity and the distance of the camera in feet from the car (i.e. the height of camera above the car) is printed on the output screen.
For this use multiple object detection algorithms could have been used but the algorithm of developing the Haar cascade and its implementation proves to be the best since it is the least time consuming, most efficient and highly reliable.
The complete implementation uses two basic processes: -
1. Car detection using Haar cascades in OpenCV
2. Measurement of velocity of detected cars using python script.

Car Detection: Object Location utilizing Haar highlight based course classifiers is a compelling item discovery strategy that uses a machine learning based approach where a course capacity is prepared from a considerable measure of positive and negative pictures. It is then used to recognize protests in different pictures. Initially, the calculation needs a considerable measure of positive (pictures of autos) and negative (pictures without autos) to prepare the classifier. At that point, we have to concentrate highlights from it. For this, haar highlights appeared in beneath picture are utilized. They are much the same as our convolutional part. Each component is a solitary esteem acquired by subtracting total of pixels under white rectangle from aggregate of pixels under dark rectangle.



Presently each and every possible size and spaces of each part is used to find out a ton of parts. (Basically imagine what measure of computation it needs? For sure, even a 24x24 window comes about in excess of 160000 parts). For every part calculation, we need to find entire of pixels under white and dim square shapes. To handle this, they introduced the important pictures.

VI. CONCLUSION

By employing frame subtraction and masking techniques, moving vehicles are segmented out. Speed is calculated using the time taken between frames and corner detected object traversed in that frames. Finally frame masking is used to differentiate between one or more vehicles. With an average error of +/-2 km/h speed detection was achieved

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