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Vehicle Tracking Speed Estimation from Traffic videos

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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. This project is to develop an algorithm to calculate the speed of the object(vehicle) detected. We have implemented the algorithm using Python Script.

I. INTRODUCTION

Detection of vehicle and tracking of speed if the crucial part of town planning. In the last decade, vision-based traffic monitoring system has received considerable attention. This can be done with the help of vehicle detection and speed monitoring. The monitoring system gives various information about, vehicle count, traffic congestion and speed of the vehicle. One of the root causes of road accidents is speed. Extracting frames from the video and comparing the speed between two given points can be used to determine whether the car is moving above the permissible limit or not. There are many algorithms available for extraction of vehicles from the background. Traditionally radar systems were used for such applications but had some limitations. So to overcome the limitations in existing

methods, various techniques have been developed for vehicle speed determination using image processing. But the main factors that would affect these image processing algorithms is, waving of tree branches, camera noise, illuminations. The goal of this current research is to develop an automatic vehicle counting system along with the detection of speed, which can process videos recorded from stationary cameras over roads e.g. CCTV cameras installed near traffic intersections / junctions and counting the number of vehicles passing a spot in a particular time for further collection of vehicle / traffic data. Vehicle Speed surveillance is a predominant factor in enforcing traffic laws. Traditionally vehicle speed surveillance was done using a radar technology which consists of a radar gun and a radar detector. Radar is an acronym that stands for Radio Detection and Ranging. Radar systems create radio waves, a form of electromagnetic energy that can be directed out into the air where the signals produced travel at the speed of light roughly 186,000 miles per second, or 3.08 x 108 meters per second. The transmission of these signals and the collection of returned energy that bounce off of objects in the path of the radar's transmission (called returned pulses) is what allows radar to be used to detect objects and range them, meaning establish their position and distance relative to the radar system's location. When a radar is used to detect the speed of an object (for example, when a police officer with a stationary radar gun is detecting the rate at which a car is moving), it does so by taking advantage of a phenomenon that occurs whereby the frequency of the radio wave for the return signal is altered because of the car's motion relative to the radar. If the car is moving toward the radar device, the return signal radio wave frequency increases. The radar gun can then use this change in frequency to determine the speed at which the car is moving. This principle, which establishes that the difference between the frequency of the emitted pulse and the frequency of the return pulse varies with the relative motion of the source to the object, is called the Doppler Effect. So, while the distance of an object can be established by the amount of time that it takes to detect the return pulse, the speed of an object can be detected by establishing the change in the pulse characteristics between transmitted and received echo. This provides a velocity along the direction in which the radar is pointing, termed the radial velocity. One point to note is that the pulse characteristic changes used to establish the speed of a moving object like a car will depend on the relative position of the car to the radar. The measured speed will be accurate if the car moves directly towards the radar. But if the car's motion is at an angle relative to the radar gun's line of sight, the speed being measured will be a component of the actual speed of the vehicle. This principle is known as the cosine error effect. Because of these errors, the United States of America's law keeps a buffer of 8km which is caused because of the above-mentioned error. Also, radar technology can track one vehicle at a time. The paper deals with vehicle detection and speed tracking which is explained more.

II.LITERATURE SURVEY

There are many researches with the same topic for estimating vehicle speed based on image processing. Survey. 1: A Vehicle Speed Estimation Algorithm Based on Dynamic Time Warping Approach -IEEE SENSORS JOURNAL, VOL. 17, NO. 8, APRIL 15, 2017 [1].Advantages of this paper is Experiment results show that the algorithm detection accuracy is better than 98%. DTW is the most relevant distance for time series analysis. But In DTW, heavy computational burden is required to find the optimal time alignment path. Also DTW has the Quadratic Complexity - Performance is directly proportional to the squared size of the input data set. Survey 2: A Novel Motion Plane-Based Approach to Vehicle Speed Estimation. [2].Advantages are The centre point of vehicle's license plate is considered as the reference point for the car and speed of each vehicle is estimated by the displacement of its license plate in the time seen by camera. Estimates the motion plane using 3D position of license plates, which are estimated by Shape-from-Template (SfT) technique. And Drawbacks are Template matching techniques applicability is limited

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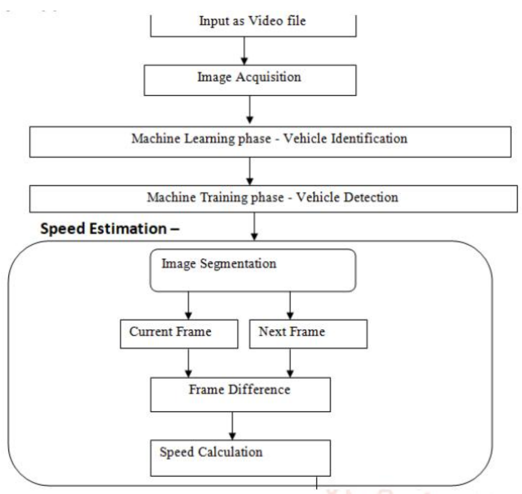
mostly by the available computational power, as the identification of big image patterns is time-consuming. Survey 3: A Deep Learning Approach for Localization Systems of High-Speed Objects [3].Advantages is Deep learning approach effectively suppresses the potential divergence of the modified EKF. Drawbacks are this approach is not used for the commercial purpose on Roadways. It is suitable to use in Aircrafts and Military purposes. High cost.

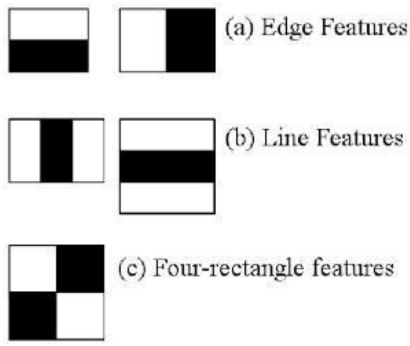
III. IMPLEMENTATION

System architecture



Methodology

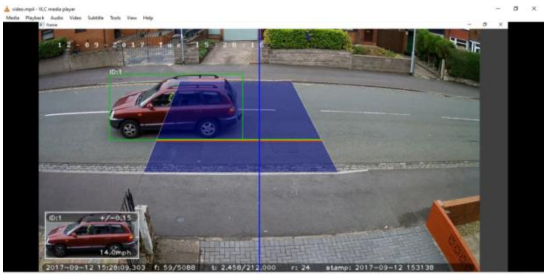
Car Detection: Object Location utilizing Haar highlight based course classifiers is a compelling item discovery strategy that uses a machine learning based approach where a course capacity is prepared from a considerable measure of positive and negative pictures. It is then used to recognize protests 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 convolution part. Each component is a solitary esteem acquired by subtracting total of pixels under white rectangle from aggregate of pixels under dark rectangle.



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 components). For each component computation, we have to discover whole of pixels under white and dark rectangles. To tackle this, they presented the necessary pictures. • Now, 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.

Speed Calculation: • Once a car is detected, using the cascade Classifier () function on the haar cascade developed. • Now the time is started which was initialized to 0. • Using the ratio in the image for each cm travelled by the detected image and real-time distance in meters, the actual distance covered by the car is calculated. • As soon as the car reaches the center of the detection window whose distance is already known to us the time is stopped. • Now the actual distance calculated is divided by the time calculated and velocity is obtained. • 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.

IV. RESULT



V. CONCLUSION

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.

REFERENCES

1. Zusheng Zhang, Tiezhu Zhao, Xin Ao, and Huaqiang Yuan A Vehicle Speed Estimation Algorithm Based on Dynamic Time Warping Approach IEEE SENSORS JOURNAL, VOL. 17, NO. 8, APRIL 15, 2017
2. Mahmoud Famouri, Zohreh Azimifar, Member, IEEE, and Alexander Wong , Senior Member, IEEE A Novel Motion Plane-Based Approach to Vehicle Speed Estimation IEEE TRANSACTIONS ON INTELLIGENT TRANSPORTATION SYSTEMS
3. W. Czajewski and M. Iwanowski, “Vision-based vehicle speed measurement method,” in Computer Vision and Graphics. ICCVG (Lecture Notes in Computer Science), vol. 6374, L. Bolc, R. Tadeusiewicz, L. J. Chmielewski, and K. Wojciechowski, Eds. Berlin, Germany: Springer, 2010, pp. 308–315.
4. Lan, J. Li, G. Hu, B. Ran, and L. Wang, “Vehicle speed measurement based on gray constraint optical flow algorithm,” Optik-International Journal for Light and Electron Optics, vol. 125, no. 1, pp. 289–295, 2014.
5. H. Sundoro and A. Harjoko, “Vehicle counting and vehicle speed measurement based on video processing,” Journal of Theoretical and Applied Information Technology, vol. 84, no. 2, pp. 233–241, 2016.
6. G. Rad, A. Dehghani, and M. R. Karim, “Vehicle speed detection in video image sequences using cvs method,” International Journal of Physical Sciences, vol. 5, no. 17, pp. 2555–2563, 2010.

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