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Vehicle Detection and Speed Tracking System

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Abstract: *This paper targets to predict the speed of a vehicle with respect to the data from a recorded video source. Serving as the hypothesis, the paper portrays the various important procedures such as unequivocal Gaussian blend, models, DBSCAN, Kalman channel, Optical stream. The game plan and the delineation of procedures for correspondence of individual area are included in the execution part. The type of vehicles, the nature of driving and the vehicle's position at the time of video capture is taken into consideration.*

Keyword: *Python(Vs code), dlib, open cv*

I. INTRODUCTION

In the recent years we can see there is a vast increase in the number of vehicles all around the globe. Along with the increase in number of vehicles increases the number of accidents. Therefore, it is important to limit the speed of the vehicles at certain zones or areas. Radar speed measurement tools are commonly used for this purpose which can be inaccurate in certain cases such as in sensing smaller vehicles with weaker echoes. Also it is difficult for these tools to detect vehicles changing in speeds too often or fast. Therefore, there is a need for a better technique to detect the speed of the moving vehicles. Than using expensive sensors such as radars, the vehicles video streaming could be used for this purpose. The video stream of the moving vehicle is given as an input, then it is passed through the filter for detecting its speed.

II. LITERATURE SURVEY

"Vehicle speed detection system," in 2009 IEEE International Conference on Signal and Image Processing Applications[1].This paper presents a flat out response for completing a getting ready module on traffic cameras that is fit for following every vehicle in the camera outline and looking over its speed reliably. A season structure for various vehicle following is used that utilizations Kalman channel and Hungarian Algorithm to pick checks. A speed estimation structure is outlined that is sufficiently liberal to work with camera feed from any edge without game-plan and camera mounted in any event stature of 7m. The system has been attempted PC made approaches in like manner as avowed conditions and speed measures have been gotten with most noteworthy goof of under 3kmph.Research of vehicle speed detection algorithm in video surveillance [2].This paper, demonstrates another Speed Detection Camera System (SDCS) that is appropriate as a radar elective. SDCS uses a few picture getting ready frameworks on video stream in on the web - got from single camera-or pulled back mode, which makes SDCS fit for figuring the speed of moving articles keeping up a central division from the standard radars issues. SDCS offers an en-over the top choice rather than traditional radars with a close precision or far unrivaled. SDCS frameworks can be withdrawn into four one of a kind stages; first stage is Objects exposure sort out.

Which uses a flavor figuring subject to joining a flexible establishment subtraction methodology with a three-plot differencing estimation which gets a handle on the affirmed weight of using fundamentally versatile establishment subtraction? The second stage is Objects following, which consolidates three remarkable exercises, Object division, Object venturing, and Object run extraction. Articles following assignment considers the various potential states of the moving thing like; simple after, object has left the scene, object has entered the scene, and object cross by another article, and article leaves and another enters the scene. Third stage is speed check organize, which is settled from the proportion of lodgings eaten up by the thing to pass by the scene. The last stage is Capturing Object's Picture form, which gets the image of things that maltreatment past what many would consider possible. SDCS is recognized and tried in various examinations; it showed to have achieved a pleasing execution. Vehicle speed measurement technique using various speed detection instrumentation [3].Advanced technology offers us various alternatives for collecting traffic data. However, different devices often result in different accuracy to the true speed of the drivers. Lack of knowledge of accuracy between different devices is often cited as a common problem for both transportation researcher and practitioner. This paper discusses the most accurate traffic data measurement device when compared to the true driving speed of the driver using the V-BOX GPS validated with the dash box of the test vehicle.

The paper illustrates and discusses the significant value R^2 of the traffic data using scatter plot, root mean squared error (RMSE), mean absolute error (MAE) and mean absolute percentage error (MAPE). The paper covers two classes of advanced traffic data collection devices which are intrusive (automated traffic classifier) and off road portable speed measurement devices (laser gun, radar gun and manual count). Results showed that automated traffic classifier have the smaller discrepancies or deviations followed by laser gun, manual count and radar gun when comparing to the global positioning system (GPS). It is extremely important to notify which devices have the most accurate data collection as any study can only be as accurate as the data on which it is based. Video size comparison for embedded vehicle speed detection travel time estimation system by using raspberry pi [4].As traffic keeps growing up, the issue with respect to the street mishap in like way developing rapidly. The difficulty occurred because of the fast of vehicles out on the town. This paper proposed a vehicle speed affirmation and travel time estimation structure utilizing Raspberry Pi to review the speed of going vehicles through this framework. The structure is required to perceive the moving vehicles and figure its speed.

The structure utilized OpenCV as a picture arranging programming to see and seek after the moving vehicles. Several sorts of getting size of the video are utilized in this structure to check and quantify the presentation of the presented board."Vehicle speed zone utilizing corner unmistakable confirmation", in Proceedings of the 2014 Fifth International Conference on Signal and Image Processing [5].The paper manages the subject of affirmation of vehicle speed dependent on data from video record. In hypothetical part we delineate the most critical methodology, explicitly Gaussian blend models, DBSCAN, Kalman channel, Optical stream. The execution part is contained the assistant plan and the portrayal of procedures for correspondence of individual pieces. The end contains the fundamental of got video records utilizing various vehicles, various natures of driving and the vehicle position at the time of chronicle. By virtue of the improvement that is developed in PC vision and AI, we can discover usage of these frameworks in different areas. One of them is traffic viewing and the heads framework, where the centrality is as of recently making with making urbanization. This paper goes for speed unmistakable verification or estimation of vehicles from video stream. These days the most remarkable approach to manage assess speed is by utilizing the radar hardware, hence it is essential to propose some various considerations like evaluating vehicle speed from video stream. Rather than equipment reliance that is issue with radar frameworks we can utilize picture dealing with, which is commonly subject to programming execution. Vehicle Speed Detection and Identification from a Single Motion Blurred Image [6].

Motion blur is a result of finiteacquisition time of practical cameras and the relative motion between the camera and moving objects. Traditionally, the image degradations caused by motion blur are treated as undesirable artifacts and usually have to be removed before further processing. In this work, we propose a novel approach for vehicle speed detection based on a single motion blurred image as opposed to the most commonly used RADAR and LIDAR devices for traffic law enforcement. The motion blur parameters are estimated from a single motion blurred image and the length of motion blur is used for image restoration. The restored image is then used to obtain other parameters for vehicle speed estimation. The images taken with the vehicle's license plates are used for both the assistance of image restoration and the identification of the vehicle. We have established a link between the motion blur information of a 2D image and the speed information of a moving object. Experiments have shown the results of less than 2% error for both local and highway traffic compared to video-based speed estimation methods.

III. EXISTING SYSTEM

In the past decades, the field of picture management has grown vastly. This has been taken away by two means: 1) the comprehensive use of imagery in pack applications, joined with 2) updates in the size, speed and cost Manuscripts. The sufficiency of cutting edge PCs and related sign orchestrating headways. Picture managing has found a basic development in shrewd, current, space and government applications. Various structures nowadays can be displaced by picture overseeing trade systems that perform better than the past structures.

SDCS system is among these structures that can declare the ordinary radars as invalid. This is ideal financially sharp system over current ones. SDCS structure can be joined with Automatic Number Plate Recognition (ANPR) system to shape a full scale radar structure. ANPR structure is a mass recognition methodology that uses optical character affirmation on pictures to research the imprints on vehicles. The makers present the key steps towards structure up the Speed Detection Radar. Here makers present another hypothesis in thing ID system, which is "flexible establishment subtraction" as itproofs that it is not sensitive to startling enlightening changes. Another part is appeared here concerning address following by making "object following blueprints".

IV.PROPOSED SYSTEM

The below shown figure (fig 1) demonstrates the block diagram of our vehicle speed detection system.

The block diagram below explains that firstly, a video is given as input to the system. The given input video is at first preprocessed according to the requirements. From the processed video sample, the vehicle is detected using the filters. This vehicle is then tracked and analyzed in order to find its speed.

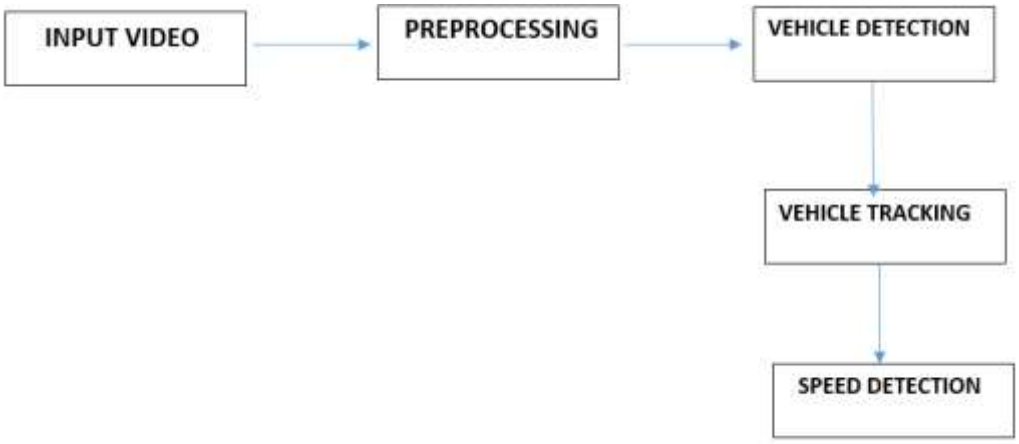

Fig. 1: Block diagram of vehicle speed detection system

4.1TERMINOLOGIES

4.1.1INPUT VIDEO

Our important need is to get the live stream of the moving vehicle using a camera. For this purpose, we make use of OpenCV. The video captured from the camera is converted to gray scale for further processing. A Video Capture object is created for getting a live stream video. Its debate can be either the contraption report or the name of a video record. The video will be canny and in the event that it is incredibly high, video will be moderate (Well, that is the course by which you can demonstrate accounts in moderate movement). 25 milliseconds will be OK in regular cases.

4.1.2PREPROCESSING

The moto behind preprocessing is to improvise the picture information in an image or a video.
The number of subcomponents that apply various corrections or enhancement features to an input image. When one or more of the preprocessing options are enabled, the subcomponents operate the corrected image.

4.1.3OBJECT DETECTION

In our project, the object detection depends on adaptable foundation subtraction procedure called Gaussian blend model. After every pixel is gathered by this model framework, portions of the frontal area focuses are shown by DBSCAN (Density − based spatial social affair of organizations with tumult) gathering technique.

4.1.4 DBSCAN CLUSTERING

DBSCAN algorithm is based on intuitive notion of cluster and noise. The key idea is that for each point of cluster the neighborhood of a given radius has to contain at least minimum number of points.
DBSCAN algorithm requires two parameters –

1. eps: It defines the neighborhood around a data point i.e. if the distance between two points is lower or equal to 'eps' then they are considered as neighbors. If the eps value is chosen too small, then large part of the data will be considered as outliers. If it is chosen very large then the clusters will merge and majority of the data points will be in the same clusters. One way to find the eps value is based on the k-distance graph.

2. MinPts: Minimum number of neighbors within eps radius. If the dataset is large we should choose larger MinPts value. In general, the minimum MinPts can be derived from the number of dimensions D in the dataset as, MinPts >= D+1. A minimum of 3 MinPts values must be chosen.

In this algorithm, we have 3 types of data points.

1. Core Point: A point is a core point if it has more than MinPts points within eps.
2. Border Point: A point which has fewer than MinPts within eps but it is in the neighborhood of a core point.
3. Noise or outlier: A point which is not a core point or border point.

DBSCAN algorithm can be explained in the following steps –

1. Find all the neighbor points within eps and identify the core points or visited with more than Min Pts neighbors.For each core point if it is not already assigned to a cluster, create a new cluster
2. Find recursively all its density connected points and assign them to the same cluster as the core point.
3. Iterate through the remaining unvisited points in the dataset. Those points that do not belong to any cluster are noise.

4.1.5 GAUSSIAN BLEND MODEL

Gaussian blend model which is also called as Gaussian mixture model is a typical structure used in division of moving areas in a picture or a video. This model is a probabilistic model. It expects that the majority of the server farms are passed from a blend of foreordained number of Gaussian streams with cloud parameters. This model is used for representing normally distributed subpopulations with an overall population.

4.1.6 LUCAS AND KANADE ALGORITHM

The Lucas and Kanade algorithm is used for the purpose of picture selection in any image or a video. The Lucas and Kanade estimation showed another framework that utilizes spatial power propensity data to mastermind the breadth for the position that yields the best match.

OPTICAL STREAM

Optical stream is a position of clear improvement of articles, surfaces, and edges in a visual scene accomplished by the relative advancement between spectators. Here the spectator is a camera capturing the scene. It is the dispersing of evident rates of value structure progression in a picture or a video. Optical stream could give the basic data about the spatial procedure of the things seen and the rate of headway of thiscourse of action. Theoptical streamcannot befiguredout locally, some of the ordinary barriers that are given during the estimation are noted.

4.1.7 KALMAN FILTER

Kalman filter is used to check the advancement headings precisely. The Kalman Filter is a beneficial recursive channel that can survey the going with condition of a dynamic structure subject to uproarious estimation. One of excitement of this filter is that it need not sit idly with the advancement history to quantify stage improvement, it fundamentally needs the closest one from the present advancement. It is a territory based framework for finding the regions of thing in the going with bundling. A Kalman channel is used to quantify the condition of a straight structure where the state is accepted to be scattered by a Gaussian.

4.1.8 SPEED DETECTION

Kalman channel along with the Optical stream isolates each improvement of the pixels which is the delineation of advancement of the vehicle. For finding out the speed of the vehicle, the system has to know the weight of the pixel. The speed of the vehicle is enrolled by the common speed of all focus in that vehicle. Finally, we find the bundling number at which the article or the vehicle entered and left the scene. The speed estimation is done by figuring the measure of edges taken up by the vehicle to go in the scene and the length of each bundling is known. The in and out time taken by the vehicle in the scene is found and the speed estimation is settled.

V. RESULT AND ANALYSIS

In this paper the Kalman channel and optical stream Lucas Kanade system are used to assess the speed of the vehicle. Firstly, the video is given as input to system. This input video is then preprocessed. This processed video is analyzed using the above techniques

FIG 2: Tracked BLOBS of the vehicle

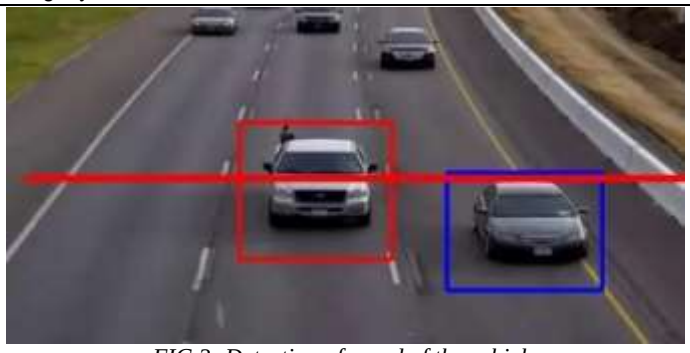

FIG 3: Detection of speed of the vehicle

VI.CONCLUSION

In this paper, we propose that the Kalman filter algorithm is capable of estimating the accurate speed of the moving vehicle. Gaussian mix model was collaborated along with this algorithm for making accurate depiction of the moving objects. The combination of optical stream and the Kalman channel helps in predicting the results even when there is a low picture quality. In our future research, we aim to improve the DBSCAN division in order to recognize each article in gathering of the vehicles and also use flexible heaps of pixels for perceiving the speed from vertical advancements.

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