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A REAL-TIME VIDEO BASED VEHICLE CLASSIFICATION, DETECTION AND COUNTING SYSTEM

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Abstract:
For many years, traffic analysis has been a challenge for city planners. More brilliant ways are being created to dissect traffic and smooth out the cycle. Examination of traffic might represent the quantity of vehicles in a space for each some erratic time span and the class of vehicles. There have been mechanisms of this kind for decades, most of which make use of proximity sensors to keep track of the number of vehicles and calculate the direction of the moving vehicle. Despite the fact that throughout the time these frameworks have developed and are exceptionally successful, they are not very spending plan well disposed. The issue is such frameworks require upkeep and occasional adjustment. Hence, this review has purposed a dream based vehicle counting and characterization framework. In order to identify and count vehicles, the system uses Gaussian Mixture Model (GMM) background subtraction to capture frames from the video and then classifies vehicles by comparing the contour areas to the assumed values. The significant commitment of the work is the correlation of two order techniques. Arrangement has been carried out utilizing Form Examination (CC) as well as Sack of Highlights (BoF).method.

Key Words: Network, Framework, GMM.

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1.INTRODUCTION

The expansion of road networks, vehicle numbers, and most importantly, vehicle sizes, has increased the need for effective traffic management and monitoring over the past few decades. Wise traffic observation frameworks are vital piece of current traffic the executives however the ordinary traffic the board strategies, for example, remote sensor networks[1], Inductive loops[2] and EM microwave detectors[3] are costly, massive and are challenging to introduce without intruding on the traffic. A decent option in contrast to these strategies can be video based observation frameworks

Video observation systems[4-8] have become less expensive and better as a result of the expansion in the capacity capacities, computational power and video encryption algorithms[9]. The recordings put away by these reconnaissance frameworks are by and large dissected by people, which is a tedious Work. To beat this limitation, the need of more vigorous, programmed video based observation frameworks has expanded interest in field of PC vision

The goals of a traffic observation framework is to recognize, track and group the vehicles however they can be utilized to do complex undertakings, for example, driver movement acknowledgment, path acknowledgment and so on. The traffic reconnaissance frameworks can have applications in a scope of fields, for example, public security, discovery of odd way of behaving, mishap location, vehicle burglary recognition, leaving regions, and individual ID. A Traffic observation framework typically contains two sections, equipment and programming. The hardware of the system is a static camera on the roadside that records the video feed; the software of the system is responsible for processing and analyzing the data. These systems could be mobile, with a microcontroller attached to each camera for real-time processing and analysis, or they could just have cameras that send the video feed to a central computer for further processing.

Different methodologies were made to foster such frameworks that can identify, count and characterize the vehicles and can be utilized for traffic reconnaissance in astute transportation frameworks. The knowledge of these systems' development methods and the discussion surrounding them are covered in this section.

PC vision innovation is utilizing for traffic observing in numerous nations [10], [11]. For the purpose of identifying moving vehicles in video streams, the advancement of computer vision technology over video-based traffic monitoring has become an essential component of ITS [12, 13]. A lot of work has been finished on vehicle following and location utilizing PC vision innovation. In 2005, Hasegawa and Kanade [14] presented a framework for recognizing and characterizing the moving items by its sort and variety. In this cycle, a progression of pictures of

a particular area were provided and vehicles from these pictures were recognized. In 2013, Nilesh et al. created a Python-and-OpenCV-based system for counting and identifying moving vehicles. It can naturally recognize and include moving articles as vehicle continuously or from recorded recordings, which essentially utilized foundation deduction, picture separating, picture paired and division technique. In 2014, Da Li et al. grown constant moving vehicle identification, following, and counting framework additionally utilizing python with OpenCV remembering versatile deducted foundation strategy for mix with virtual finder and mass following innovation. In each input image frame, the blobtracking method generates the absolute difference between the background image and foreground blobs representing the vehicles on the road, while the virtual detector creates a set of rectangular regions. The above frameworks have a few impediments like handling shadows, impediment of different vehicles that show up in a solitary district. Currently, Peek Traffic Corporation has developed a number of commercially available video traffic detection systems.

2.LITERATURE SURVEY

An optimized virtual loop method-based video-based real-time vehicle counting system was proposed by Tursun, M., and Amrulla, G. [4]. They calculated the number of vehicles passing a road using real-time traffic surveillance cameras placed over roads. In this framework including is finished in three stages by following vehicle developments inside a following zone called virtual circle. One more video based vehicle counting framework was proposed by Lei, M., et al. [5]. Adaptive background estimation and Gaussian shadow elimination were the two primary methods utilized in this system, which utilized surveillance cameras mounted at relatively high locations to acquire the traffic video stream. The system's accuracy rate is influenced by the visual angle and its capacity to eliminate ghost effects and shadows. The framework's inadequacy to group vehicle type is the center limit of the framework

Bas et al. proposed a video examination technique to count vehicles [10] in view of a versatile jumping box size to identify and follow vehicles as per assessed separation from the camera. The District of Interest (return for money invested) is distinguished by characterizing a limit for each outbound and inbound in the picture. Albeit the calculation is improved to manage a few weather patterns it can't follow vehicles when they shift their bearings.

Mithun, N.C., et al proposed a vehicle discovery and order framework utilizing time spatial picture and different virtual identification line[6]. A two-step K closest area (KNN) calculation is embraced to characterize vehicles by means of shape invariant and surface based highlights. Tests affirm the better precision and low mistake pace of proposed technique over existing strategies since it additionally considers the different enlightenment conditions

HabibuRabiu proposed a vehicle discovery and grouping for jumbled metropolitan convergence [11]. In this framework foundation deduction and kalman channel calculation are utilized to distinguish and follow the vehicles and Direct Discriminant Examination classifier is utilized for legitimate order of vehicles.

Recognition of vehicles in a video based traffic observation framework is first and vital stage as it enormously influences different calculations, for example, following and grouping of the vehicles consequently an exact discovery and division of the closer view moving item is vital. A significant number of the methods are utilized for closer view discovery like edge differencing [12]. Outline differencing can be considered as the easiest frontal area location and division strategy as it depends on the cozy relationship among the succession of movement pictures.

A better edge differencing strategy was introduced by Collins [7] which utilizes contrast between various casings to figure the forefront rather than simply utilizing the underlying edge. One more technique named as Optical Stream Field strategy was brought out by Gibson[13]. Wu, K, et al. recommended that the optical stream addresses the speed of mode inside a picture [14].Optical Stream technique takes picture inside the distinguishing region as a vector field of speed; every vector addresses the transient variety of the situation for a pixel in the landscape. One more strategy used to distinguish frontal area is normal model [8]. In normal model the normal dark worth of a pixel in a grouping of casings is considered as the foundation worth of same pixel. A GMM was proposed by Friedman, N. what's more, S. Russell.[15] and was refined for ongoing following by Stauffer, C. what's more, W.E.L. Grimson[16, 17].

3.SYSTEM ANALYSIS AND DESIGN

EXISTING SYSTEM

A vehicle identification and characterization framework utilizing time spatial picture and different virtual discovery line[6]. A two-step K closest area (KNN) calculation is embraced to characterize vehicles by means of shape invariant and surface based highlights. Tests affirm the better precision and low mistake pace of proposed technique over existing strategies since it additionally considers the different brightening conditions. There have been mechanisms of this kind for decades, most of which make use of proximity sensors to keep track of the number of vehicles and calculate the direction of the moving vehicle. Despite the fact that throughout the time these frameworks have developed and are exceptionally successful, they are not very spending plan well disposed. The issue is such frameworks require upkeep and occasional adjustment.

PROPOSED SYSTEM

The framework could be utilized for location, acknowledgment and following of the vehicles in the video casings and afterward characterize the identified vehicles as per their size in three unique classes. The proposed framework depends on three modules which are foundation learning, closer view extraction and vehicle characterization as displayed in fig. 1. Foundation

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deduction is a traditional way to deal with get the forefront picture or all in all to distinguish the moving items. We have proposed a versatile video based vehicle location, grouping, counting for constant traffic information assortment. The proposed framework was fabricated utilizing python programming language and OpenCV. The principal objective for fostering this framework is to gather vehicle count and arrangement information. With the goal that we can assemble shrewd transportation network in view of verifiable traffic information. The proposed framework can induce traffic information by recognizing, characterizing, counting It's a fitting and play framework and applied Just go for it calculation as a foundation deduction method. The proposed framework was tried at various six areas in Hyderabad under various traffic and ecological circumstances.

SYSTEM ARCHITECTURE

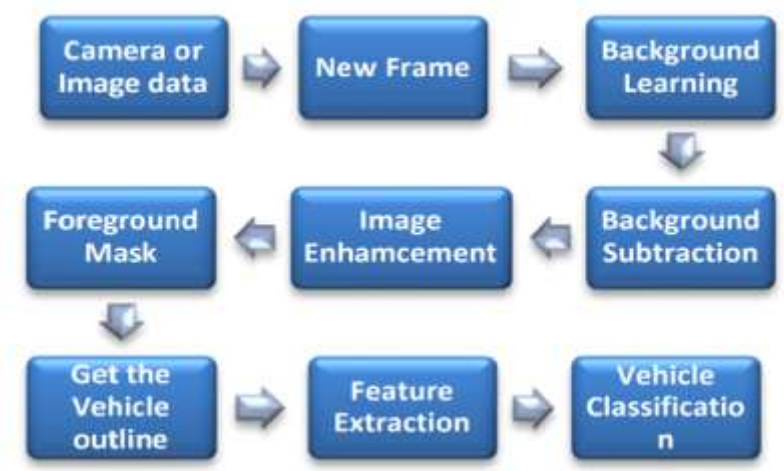

Fig.1. Block diagram of proposed vehicle detection, counting and classification system.

4.CONCLUSION

The Open CV bindings are used to implement the proposed solution in Python. The traffic camera recordings from assortment of sources are in execution. The user can select the area of interest to be analyzed via a straightforward interface; image processing techniques are then used to classify and count the vehicles. For the purpose of collecting real-time traffic data, we have developed video-based vehicle detection, classification, and counting. We have utilized Foundation Deduction Just go for it calculation, OpenCV, and python for fostering the framework. In the proposed framework, we have thought about the entire constantly shadowing, and different lighting circumstances. Additionally, we have thought about the moving shadow of moving vehicles.

REFERENCES

[1] I. Alam, M. F. Ahmed, M. Alam, J. Ulisses, D. M. Farid, S. Shatabda, and R. J. F. Rossetti, "Pattern mining from historical traffic big data," in IEEE Technologies for Smart Cities (TENSYMP 2017). IEEE, July 2017, pp. 1–5.

[2] I. Alam, D. M. Farid, and R. J. F. Rossetti, "The prediction of traffic flow with regression analysis," in Emerging Technologies in Data Mining and Information Security, ser. Advances in Intelligent Systems and Computing, A. A., D. P., M. J., B. A., and D. S., Eds. Springer, Singapore, 2019, vol. 813, pp. 661–671.

[3] A. Talebpour, H. S. Mahmassani, and S. H. Hamdar, "Effect of information availability on stability of traffic flow: Percolation theory approach," Transportation Research Procedia, vol. 23, pp. 81–100, 2017.

[4] M. Dell'Orco and M. Marinelli, "Modeling the dynamic effect of information on drivers' choice behavior in the context of an advanced traveler information system," Transportation Research Part C: Emerging Technologies, vol. 85, pp. 168–183, 2017.

[5] A. Csikos, T. Charalambous, H. Farhadi, B. Kulcs ´ ar, and H. Wymeersch, ´ "Network traffic flow optimization under performance constraints," Transportation Research Part C: Emerging Technologies, vol. 83, pp. 120–133, 2017.

[6] M. Zhou, X. Qu, and X. Li, "A recurrent neural network based microscopic car following model to predict traffic oscillation," Transportation Research Part C: Emerging Technologies, vol. 84, pp. 245–264, 2017.

[7] F. B. Ghorghi and H. Zhou, "Traffic control devices for deterring wrongway driving: historical evolution and current practice," Journal of Traffic and Transportation Engineering, vol. 4, pp. 280–289, 2017.

[8] A. Abadi, T. Rajabioun, and P. A. Ioannou, "Traffic flow prediction for road transportation networks with limited traffic data," IEEE Transactions on Intelligent Transportation Systems, vol. 16, no. 2, pp. 653–662, 2015.

[9] S.-Y. Cheung, and P.P. Varaiya, "Traffic surveillance by wireless sensor networks: Final report", PhD diss., University of California at Berkeley, 2006.
[10] S. Oh, S. Ritchie, and C. Oh, "Real-time traffic measurement from single loop inductive signatures", Transportation Research Record: Journal of the Transportation Research Board, (1804), pp. 98-106, 200