A Study of Vehicle Detection using different Object Detection Methods in Video and Satelites in Digital Image Processing

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***Abstract*—** Digital Image Processing implies preparing digital image by methods for a digital computer. We can likewise say that it is an utilization of computer algorithms, so as to get upgraded image either to remove some helpful data. Vehicle detection and order of vehicles classification a vital job in basic leadership with the end goal of traffic control and the management. Vehicle detection and tracking plays a successful and critical job in the region of traffic observation framework where effective traffic the executives and security is the principle concern. In this paper, we talk about and address the issue of recognizing vehicle/traffic information from video frames. Albeit different looks into have been done around there and numerous techniques have been executed, still this region has space for enhancements [1].

Keywords*-Image Processing; digital; video; technique, vehicle.*

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I. IMAGE

A image is characterized as a two-dimensional function,F(x,y), where x and y are spatial coordinates, and the amplitude of F at any combine of coordinates (x,y) is known as the power of that image by then. Whenever x,y, and amplitude values of F are limited, we consider it an digital image.

As such, a image can be characterized by a two-dimensional array explicitly organized in rows and columns.

Digital Image is made out of a finite number of components, every one of which components have a specific value at a specific area. These components are alluded to as image component and pixels A Pixel is most broadly used to indicate the components of a Digital Image.

II. TYPES OF AN IMAGE

BINARY IMAGE– The binary image as its name recommends, contain just two pixel components i.e 0 and 1,where 0 refers to black and 1 refers to white. This image is otherwise called Monochrome.

BLACK AND WHITE IMAGE– The image which contain only black and white color is called BLACK AND WHITE IMAGE.

8 bit COLOR FORMAT– It is the most important image format. It has 256 different shades of colors in it and generally known as Grayscale Image. In this format, 0 stands for Black, and 255 stands for white, and 127 stands for gray.

16 bit COLOR FORMAT– It is a color image format. It has 65,536 different colors in it. It is also known as High Color Format. In this format the distribution of color is not as same as Grayscale image.

A 16 bit format is actually divided into three further formats which are Red, Green and Blue. That famous RGB format.

III. PHASES OF IMAGE PROCESSING:

1.**ACQUISITION**– It could be as simple as being given an image which is in digital form. The main work involves:

a) Scaling

b) Color conversion(RGB to Gray or vice-versa)

2.**IMAGE ENHANCEMENT**– It is amongst the simplest and most appealing in areas of Image Processing it is also used to extract some hidden details from an image and is subjective.

3.**IMAGE RESTORATION**– It also deals with appealing of an image but it is objective(Restoration is based on mathematical or probabilistic model or image degradation).

4.**COLOR IMAGE PROCESSING**– It deals with pseudocolor and full color image processing color models are applicable to digital image processing.

5.**WAVELETS AND MULTI-RESOLUTION PROCESSING**– It is foundation of representing images in various degrees.

6.**IMAGE COMPRESSION**-It involves in developing some functions to perform this operation. It mainly deals with image size or resolution.

7.**MORPHOLOGICAL PROCESSING**-It deals with tools for extracting image components that are useful in the representation & description of shape.

8.**SEGMENTATION PROCEDURE**-It includes partitioning an image into its constituent parts or objects. Autonomous segmentation is the most difficult task in Image Processing.

9.**REPRESENTATION & DESCRIPTION**-It follows output of segmentation stage, choosing a representation is only

the part of solution for transforming raw data into processed data.

10.**OBJECT DETECTION AND RECOGNITION**-It is a process that assigns a label to an object based on its descriptor.

IV. RELATED WORK

The point of sumalatha kuthadi examine is to create effective algorithms for automatic detection, grouping and tallying of the vehicles from high-resolution satellite images. The images utilized for that venture are 1-m panchromatic images from the IKONOS satellite. Two diverse Image Segmentation algorithms, which depend on Multiple Thresholds and Otsu Threshold, are created for vehicle detection. These algorithms were tried on a few images and the outcomes were broke down to figure out which algorithms gives better outcomes under which conditions.

The fleet of vehicles in urban areas keeps on expanding and checking vehicles fleet is a developing need. Various urban communities particularly in created nations use field based gear, for example, cameras introduced at settled areas or say something movement sensors on the asphalts to screen traffic. As of late video imaging and airborne imaging is tried particularly to give progressively brief perspective of traffic and to screen traffic directions (Zhang et al. 2003). Aeronautical photography has likewise been assessed (Hinz 2003, Schlosser et al. 2003) and the recently accessibly symbolism at high goals gives another chance and begins additionally to be considered (Rocio Alba Flores 2004). The examination of optical, infrared and SAR information (Stilla et al. 2004) indicates clearly they are the two favorable circumstances and restrictions. For instance SAR sensor is autonomous from day/night and climate condition yet its slanted view causes twisting, the nearness of structures shrouds a few streets and its investigation is particularly influenced by the experience of the mediators (Lohmann et al. 2004).

As per [2] Multiple Thresholds does not distinguish those vehicles that have intensity values like the path markers. In view of the sliding neighborhood task, the measure of the more brilliant vehicles identified by the Otsu edge is more noteworthy than the span of the more brilliant vehicles distinguished by Multiple Thresholds. In the event that the vehicles are near one another, there are potential outcomes of getting them recognized as a solitary vehicle. While recognizing the vehicles, dark and bright vehicles are distinguished in two diverse parallel images. These two parallel images are joined to consolidate a vehicle with its shadow. On the off chance that a bright vehicle has no shadow and a dark vehicle is near this vehicle, at that point there are conceivable outcomes of getting dim and splendid vehicles joined as a solitary vehicle. This will change the aftereffect of the check of the vehicles [2].

As per Lizhu Xie, Beijing Jiaotong Univ., Beijing, China [3] With the enhancement of satellite resolution and the object-oriented detection technique in satellite images, traffic information can be all the more rapidly and broadly procured in vast region satellite images contrasted and the conventional information acquired strategy.

With the innovation of image enhancement, in their paper enhanced the image quality first, and after that used the multi-scale division innovation and managed arrangement technique to identify the vehicle from satellite images. All the while, three characterization choice trees for vehicles in various circumstances have been summed up. Finally, they accomplished the exact research utilizing the remote detecting images of commonplace areas in the urban street from Worldview-2 and the GeoEye-1. In view of the exactness investigation of the exploratory outcomes, demonstrates that the normal precision is over 90% [3].

As indicated by Hong Zheng and Li Vehicle targets extraction is another exploration issue for high resolution satellite imagery application in transportation. In their paper, a artificial immunee methodology is introduced to separate vehicle focuses from high esolution panchromatic satellite symbolism. This methodology utilizes the neutralizer arrange idea propelled from the invulnerable framework to become familiar with a lot of formats called antibodies for vehicle detection. In light of scholarly format antibodies, a safe identification procedure is proposed to find vehicle focuses in satellite symbolism, and a morphology based preprocessing algorithm is likewise created to produce competitor layout antibodies. Examinations on 0.6 meter resolution QuickBird panchromatic images are accounted for in this paper. The exploratory outcomes demonstrate that the proposed methodology has a decent discovery execution [4].

As indicated by Sun, Q., Liang, Y., Tan, Q., and Zhang, S. (2009) A progression of sensors on the asphalts being utilized for traffic flow information detection have a few impediments. With late advances in high- resolution business remote sensing frameworks, recognizing traffic flow information from remote sensing images over vast areas is an alluring choice in rush hour gridlock data gathering innovation. The fundamental objective of their exploration is investigating vehicle data from high- resolution satellite remote sensing images. Another strategy for vehicle detection dependent on item arranged image examination is created and connected in their paper. Examining high-resolution satellite image qualities, object-oriented segmentation is actualized here so as to create image objects. At that point include space is made by removing highlights of these articles, to be utilized for vehicle detection, order, and traffic flow data investigation. Their trial results depicted and evaluated to demonstrate how this strategy is viable. Their examination gives a methods for traffic flow data gathering in ITS when contrasted with conventional methodologies [5].

As indicated by Eikvil, Line; Koren, Hans; they have investigated the issue of vehicle detection in high-resolution satellite images. In light of the contribution from the nearby street experts, they have concentrated on roadways, as well as on internal city streets, where more mess is normal. The examination site is the city of Oslo, Norway. To do vehicle location in these territories, they propose a programmed methodology, comprising of a division step, trailed by two phases of article characterization. Simultaneously, they use multispectral images, panchromatic images and a street arrange. The methodology has been tried on Quickbird images, and the outcomes that are gotten have been contrasted and manual counts and classifications [6].

V. THE APPLICATION FOR SEARCHING OBJECTS IN VIDEO FILES

Detecting and tracking moving items in video records has wide scope of uses, all things considered. In the event that an individual just watches a video file, human eyes won't probably give explicit insights regarding the time and the way toward changing area of articles, particularly those with a quick change process, (for example, identification of human face, grin recognition when taking images, autos out and about, the way of a moving tennis ball and others), objects with convoluted circles, (for example, soccer players running on the pitch), or items with a procedure of progress gradually contrasted with the foundation (protests between the ocean and sky, sunlight changes, and tides). Furthermore, the item identification in the video record right now will help a great deal, in actuality, for instance, to decide whether there was an objective or not (in football), if a tennis balls is in/out of court (in tennis), or which competitor has completed first (in speed races) [18].

VI. OBJECT DETECTION

Object detectionn in videos includes identifying the nearness of an article in a grouping of images and area for exact recognition. Article following is to screen item's spatial and worldly changes amid a video arrangement, including its essence, position, measure, shape, and so on. The over two procedures are interrelated on the grounds that following needs the items to identified, while distinguishing an article more than once in ensuing casings is important to help and check the tracking.

There are three key advances engaged with a video based detection frameworks: discovery of intriguing moving items (object detection), following of such articles from casing to outline (object tracking), and investigate the outcomes to perceive their conduct (objects recognition and pose estimation) [8].

These methods can generally be classified into:

- Feature and based Methods
- Template based Methods
- Motion based Methods

Feature based object detection

Feature based detection is based with respect to recognizing the focal points in a image, for example, edges, corners, shading pieces, blobs, their points (corners) and ridges. Feature based methods are commonly actualized with respect to singular images instead of a succession of images. The center algorithm in these strategies being isolated into two classifications, 1) extract features 2) characterize these features and prepares a framework for acknowledgment and arrangement. Feature (explicit structures, for example, focuses, edges, bends, limits and so forth.) determination is critical as whatever remains of the calculation relies upon how great the highlights are recognized [9]. There are a few methodologies received for feature selection and learning strategies for pedestrian and vehicle detection. Papageorgiou et. al. [10] connected Support Vector machine (SVM) and Haar Wavelet highlights to prepare a person on foot identifier. D. M. Garvilla [11] utilizes image coordinating utilizing separation changes including the highlights extricated locally at different image areas, for example, edge focuses. Leibe et. al. [12] pursues a two arranged methodology, initial a codebook is made that contains data of nearby structures show up on the article (neighborhood shape highlight data) and in the second step, a verifiable shape demonstrate is prepared to group and perceive objects. Notwithstanding static local features, for example, force, Viola et. al. [13] utilized local motion feature include data to identify face and pedestrians.

Dalal et. al. [14] actualized privately standardized Histogram of Oriented Gradient (HOG) descriptors which use edge orientation histograms. This strategy ended up being powerful and accomplished promising outcomes for passerby identification. Wu et. al. [15] have accomplished comparable identification results with discriminative neighborhood shape and contour fragments and edge-let features.

Template based object detection

Template based detection is the process of matching features between a template and the image under analysis. A simple version of template matching involves the image which is represented as a bi-dimensional array of intensity values, is compared using a suitable metric (typically the Euclidean distance) with a single template representing the object. In template-based object detection, the features of tracked templates are learned in the initialization phase of the detection process. The detection algorithm then searches the frame for these features. Occlusion is distinguished by the nonattendance of the template features includes in the casing past a specific threshold. Objects in such algorithm are not recognized amid impediment but rather after article return. While such calculations function admirably to track of single items, they neglect to vigorously follow numerous articles amid

impediment. Split isn't unequivocally distinguished, in any case, if the item is part because of a deterrent, the minimization of the layout's component correlation capacity will decide to which bit of the split article the match is made, assuming any. Probabilistic models are being produced as templates to describe diverse articles [16].

Motion based object detection

The ability of removing moving objects from a video sequence is an average initial phase in computer vision applications. The movement of the objects muddles process by including object's temporal change prerequisites; then again, it likewise gives extra data to detectionn and tracking. A typical methodology for segregating moving objects from the foundation is recognition by foundation subtraction. The essential thought of foundation subtraction is to subtract or contrast the present image from a reference foundation demonstrate. The subtraction recognizes non-stationary or new objects [17]. Foundation subtraction is a basic piece of item location frameworks as its result is encouraged to more elevated amount procedures, for example, object recognition and following and these procedures depend vigorously on the exactness of tracking subtraction systems. The execution of foundation subtraction techniques immensely rely upon the foundation display.

VII. CONCLUSION

Vehicle detection and tracking plays a viable and critical job in the zone of traffic observation framework where effective traffic the executives and wellbeing is the primary concern. In this paper, we examine and address the issue of identifying vehicle/traffic information from video frames. Albeit different inquires about have been done around there and numerous techniques have been actualized, still this zone has space for upgrades [7].

VIII. REFERENCES

[1] Prem Kumar Bhaskar,Suet-Peng Yong, "Image processing based vehicle detection and tracking method", 31 July 2014.

[2] Sumalatha Kuthadi, Department of Computer Science University of Minnesota Duluth Duluth, U.S.A. May 2005.

[3] Lizhu Xie, "Research on Vehicle Detection in High Resolution Satellite Images Beijing Jiaotong Univ.", Intelligent Systems (GCIS), 2013 Fourth Global Congress on 3-4 Dec. 2013 Page(s): 279 – 283.

[4] Hong Zheng and Li Li, "Artificial Immune Approach for Vehicle Detection from High Resolution Space Imagery", IJCSNS International Journal of Computer Science and Network Security, VOL.7 No.2, February 2007.

[5] Sun, Q., Liang, Y., Tan, Q., and Zhang, S. (2009) "Research on Vehicle Information Extraction from High-Resolution Satellite Images". ICCTP 2009: pp. 1-7.

[6] Eikvil, Line; Koren, Hans; Aurdal, Lars, "Classification-based vehicle detection in high-resolution satellite images", ISPRS journal of photogrammetry and remote sensing (Print) (ISSN 0924-2716). 64(1) pp 65-72.

[7] Prem Kumar Bhaskar, Suet-Peng Yong, "Image processing based vehicle detection and tracking method", 2014 International Conference on Computer and Information Sciences (ICCOINS), 31 July 2014.

[8] Alper Yilmaz, Omar Javed, Mubarak Shah, "Object Tracking a Survey" ACM Computing Surveys, Vol. 38, No. 4, Article 13, Publication date: December 2006.

[9] C. Faloutsos, R. Barber, M. Flickner, J. Hafner, W. Niblack, D. Petkovic, and W. Equitz, "Efficient and Effective Querying by Image Content" Journal of Intelligent Information Systems Vol 3 Issue 3-4 1994.

[10] Constantine P. Papageorgiou, Michael Oren, Tomaso Poggio, "A General Framework for Object Detection," iccv, pp.555, Sixth International Conference on Computer Vision (ICCV'98), 1998.

[11] D M Gavrila, "Multi-Feature Hierarchical Template Matching Using Distance Transforms," icpr, vol. 1, pp.439, 14th International Conference on Pattern Recognition (ICPR'98) - Volume 1, 1998.

[12] Leibe, B., Leonardis, A., & Schiele, B. Combined object categorization and segmentation with an implicit shape model. In ECCV'04 workshop on statistical learning in computer vision.

[13] Paul Viola, Michael J. Jones, Daniel Snow, "Detecting Pedestrians Using Patterns of Motion and Appearance," iccv, vol. 2, pp.734, Ninth IEEE International Conference on Computer Vision (ICCV'03) - Volume 2, 2003.

[14] Navneet Dalal, Bill Triggs, "Histograms of Oriented Gradients for Human Detection," cvpr, vol. 1, pp.886-893, 2005 IEEE Computer Society Conference on Computer Vision and Pattern Recognition (CVPR'05) - Volume 1, 2005.

[15] Bo Wu, Ram Nevatia, "Simultaneous Object Detection and Segmentation by Boosting Local Shape Feature based Classifier," cvpr, pp.1-8, 2007 IEEE Conference on Computer Vision and Pattern Recognition, 2007.

[16] Carlos Vazquez, Mohammed Ghazal, Aishy Amer, "Feature-based detection and correction of occlusions and split of video objects" 2008, SIViP (2009) 3:13– 25 DOI 0.1007/s11760-008-0055-6.

[17] Kyungnam Kim, Thanarat H Chalidabhondgse, David Harwood , Larry Davis, "Real-time foreground–background segmentationusing codebook model", doi:10.1016/j.rti.2004.12.004.

[18] Cuong Nguyen The, Dmitry Shashev, "METHODS AND ALGORITHMS FOR DETECTING OBJECTS IN VIDEO FILES", MATEC Web of Conferences 155, 01016 (2018), IME&T 2017 https://doi.org/10.1051/matecconf/201815501016.