A Moving Object Recognition using Video Analytics

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Abstract— The process of recognizing of moving object is considered as a difficult task in the image processing .Moving Object recognition is an important task of computer vision because it is inclusion of the success of certain applications in computer vision. A number of algorithm and system has been put forward but still a challenging task because of illumination changes, background subtraction & occlusion. Video is captured from the database and then the video is changes to number of frame using mat lab and the frame which is extracted are going to save in a database and the object image which is retrieve from other sources we will match the features of the object from the saved database object using feature extraction technique and algorithm and after getting recognized object. We will do verification and validation of the object using false acceptance rate and false detection rate and by analyzing the value of data we get exact details that the object is recognized. In this process we use several algorithm such as SIFT and SURF and other classifying algorithm to recognize the object. In this project we discuss about the background subtraction, interest point detector, optical flow and temporal differencing to recognize the object. Extensive experiments are carried out in order to show the effectiveness of the proposed approaches.

Key words: Security, Background Subtraction, Classification SIFT, SURF, Object Recognition

I. INTRODUCTION

Detection of object and the recognition of object are the two section of moving object recognition. The target of recognition of object is to categorize an object into several predefined class stationed on different features. Detecting the object is the initial stage in the procedure which gives information about background and foreground object. Since the detection of object only determines the object but to verify and validate the object we express to do the recognizing the object stationed on feature extraction. In earlier time video data is being too compressed for video surveillance but now we just convert the video to images to detect the specified object. [6]In many section of the background subtraction methods, the object recognition are persuaded by the background information which leads to false detection. Further, an effective classifier is required to segregate the target in cluttered environments Recent approach in computer vision has decidedly reduced the deadlock of object recognition and classification. Descriptor algorithms are particularly useful, forming the basis for much recognition and classification applications. In the expected method, Matlab code is used for video compression because of its highest energy compacting and to achieve less storage requirements. The algorithm has its owned three main sections: (1) Detect interest point, (2) local neighborhood description and (3) matching. [7]The primary opinion of the expected stabilization algorithm is to first determine the affine image transformations between all neighboring frames of the video. This method applied to point comparison among two images and consider the inlier points and rejects the outlier points. Then the video frames are enfold to achieve a equalize video. We presented distinct approaches of recognizing object using different method such as background subtraction, temporal differencing, optical flow, point detector. We also discussed about the edge based feature and K-n n nearest neighbor SIFT Descriptor algorithm and SURF Descriptor algorithm. We will trail to figure out the data using FAR and FRR to get accurate results. Extensive experiments are borne out in form to show the performance of the proposed approaches. XThe paper is arranged as follow: Section II covers issues and challenges facing in object recognition Section III presenting the object recognition analysis. Section IV presenting the related work, and finally, we conclude in section V with acknowledgement.

II. LITERATURE REVIEW

Kuei Chen et al [1] stated that the proposed novel concept skips the training phase required in previous recognition works, and it comprises independent tracking and detection function, which collaborates with each other to make the detection more precise. The users can manipulate the camera to interact with the object to learn the appearance of the object in different situations, and the object can thus be tracked and detected in real-time. Limitation it is only a pattern matching with learned templates

Chia-Hung Yeh, Kahlil Muchtar, et al [2] in this paper they use a texture background modeling method, which only detects the texture of the foreground object but can resist illumination. They apply hysteresis thresholding on both texture and color background models to generate predominant and supplementary images changes and shadow interference.

The proposed motion history applies spatial-temporal information to alleviate the cavity and fragment problems in foreground objects. Limitation A more challenging task in background subtraction occurs when a foreground object moves toward the camera or is almost motionless.

Masayuki Yokoyama et al [3] in this they give details of detecting moving edges by using a gradient-based optical flow technique and an edge detector. Their method is robust because we use edge-based features which are insensitive to illumination changes. This restoration, many lines of moving objects are restored, and their shapes become clearer. Their method is a contour-based detection, which allows users to obtain more accurate information than previous methods using rectangles. Limitation these techniques are computationally too expensive for real-time applications.

Shuji Zhao et al [4] in this paper they do video object recognition system to multiclass object recognition context, dealing with unbalanced data sets and comparing our results

to state-of-the-art methods test our STTK-based object recognition system on a database of car tracks containing 3 car model thoroughly compared our approach to state-of-the-art methods, key frame-based, dictionary-base and random-ferns approaches, showing that the method provides very interesting results on reference databases

After studying the literature, it is found that detecting of the object from the video sequence and also recognizing the object it is a really challenging task. Object detection and recognition remains an open research problem even after research of several years in this field. A robust, accurate and high performance approach is still a great challenge today. The difficulty level of this problem highly depends on how one defines the object to be detected and recognized. Extensive experiments are carried out in order to show the effectiveness of the proposed approaches.

III. Analysis on Moving Object Detection

The overview of our moving object detection, identification and recognition system is shown in Figure 3.1.The proposed system is adept to differentiate the foreground objects from the fixed background object in dynamic scene, detection and discriminate the objects and remove the unwanted things and classify the recognized object using analysis. In this and following chapters we describe the computational models employed in our approach to reach the goals specified in system design Distinguished the foreground objects from the stable background are both a significant and crucial research problem. Relatively all of the visual surveillance systems' has entirely initial step is to detecting foreground objects. This both generate a focus of attention for superior processing stage such as recognizing, classification and behavior understanding and reducing computation time appreciably since only pixels inclusion to foreground objects use to be dealt with it.

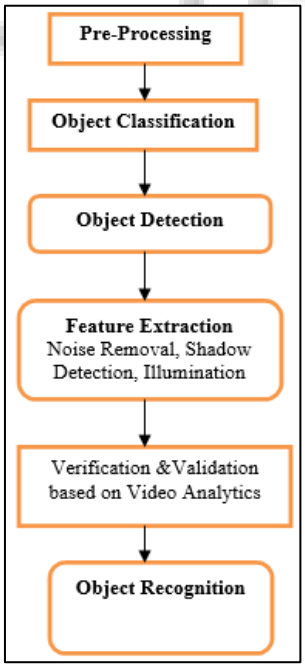

Fig. 1: Block Diagram of System Design

In the final stage of the detecting process, a various number of object features are derived from current image by adopting the foreground pixel. These features are the area, hierarchical centroid and color histogram of the regions corresponding to objects. An approach to detect the moving object using the feature from the video sequences after converting the video to frame and detecting the desired object in frame. For the recognition part of the moving object, we are discussing in next chapter with some feature extraction.

IV. Feature Extraction for Object Recognition

The unbiased of object recognizing is to authorize a correspondence between objects or object parts in successive frames and to excerpt temporal information about objects such as trajectory, posture and direction. Recognizing detected objects frame by frame in video is a compelling and hard task. It is an imperative part of agile surveillance systems since without a recognizing the object, the system could not excerpt cohesive temporal information about objects and higher level behavior analysis steps would not be possible. On the other part, mistaken foreground object segmentation due to shadow, reflection and occlusions makes recognizing an object is a difficult task in research problem. We track objects as a whole from frame to frame. The information extracted by this level of chasing is adequate for max of the smart surveillance applications. Our approach is to make a use of the object features such as size, center of mass, bounding box, height width and color histogram which is extracted in previous steps to establish a matching between objects in consecutive frames.

There are several feature extraction used in to recognize the object and the features are as:

A. Automatic cropping

Instead of manually doing rules or score functions for composition, we cropped the model image from a large part of well-composed images via discriminative classifier training. Using automatic cropping the exterior boundary will get crop and exact image will get from frame.

B. Connected Component

Connected component analyzing works on by scanning an image, pixel-to-pixel (from left to right and bottom to top) in order to analyzed combined pixel regions, i.e. regions of adjoining pixels which share the same set of intensity values.

C. Blobs Demo

Blob detection was used to obtain regions and area of interest for farther processing. These regions could be noticeable in the presence of objects or parts of objects in the image domain with application to object recognition.

D. Hierarchical Centroid

When the hierarchical centroid source code will run it will give the output in two different forms one is if the image is same then the distance between two images will consider zero and when the image is different or slightly change also due to some variation then the distance between the two images will come in some value.

E. Hough-Line transforms

The principal of the technique is to find incomplete instances of objects within an assure class of shapes by a voting technique. The classy Hough line transform was distressed with the identification of straight lines in the image.

F. Principal Component analysis

PCA is mostly used as tool in exploratory data analysis and for making predictive models. PCA can be done by eigenvalue decomposition of a data covariance (or correlation) matrix or singular value decomposition of a data matrix, for the most part after mean focusing (and normalizing or utilizing Z-scores) the information grid for each characteristic.

G. Segmentation

The objective of segmentation is to improve and additionally change the portrayal of a picture into something that is more significant and less demanding to break down. Image segmentation is regularly used to find objects and boundaries (lines, bends, and so on.) in images. The most straightforward strategy for image segmentation is called thresholding method.

H. Height & width

The measuring of the object is important to recognize its size which should be identical to the saved database.

I. Scale invariant Feature transform

It is an algorithm in computer vision to detect and describe local features in images. An object is perceived in another picture by separately contrasting each component from the new image to this database and finding candidate matching features based on Euclidean distance of their feature vectors.

J. Speed up robust feature

The objective of descriptor is to afford a unique and robust description of an image feature, e.g.: by charactering the intensity distribution of the pixels within the neighborhood of point of interest. By measuring the descriptor obtained from different image matching pairs can found. By running the code if the image 1 is match with image 2 and matching point is greater than 80% then the result will be matching found and if the image 1 is not matching with image 2 then the result will be not matching found. As an approach to recognize the moving object this above feature extraction is used to recognize the detected object and to verify and validate the recognized object will do further processing of verification and validating based on video analytics in next following chapter.

V. VERIFICATION & VALIDATION BASED ON VIDEO ANALYTICS

Feature extraction is one of the steps followed in object verification system. Feature means similar characteristics and Extraction means accurately retrieve those features. A proper feature extraction can increase the recognition ratio. It plays an important role in development of the robust system as all other phases are based on these features. The system should neither be too sensitive or too coarse. It should have an acceptable trade-off between a low False Acceptance Rate (FAR) and a low False Rejection Rate.

FRR= Number of genuine image rejected/Number of genuine image tested.

FAR= Number of false image accepted/ Number of false image tested.

EER = FAR+FRR/2

The recognition is done by comparing features of an object to the features of objects of the database using Euclidean distance method and a fast nearest neighbor algorithm which is used to perform fast in a bigger dataset. Once Bag of SIFT features of the query is found then distance is calculated between Bag of SIFT features of the query and the database features using Euclidean distance method. Identification and classification are done by KNN nearest neighbor classifier. A good compromise, in order to have the simplicity of the fixed rule approach yet avoid the difficulty of the trained rule approach, is the k-Nearest Neighborhood (k-NN) based classifier. K-NN is the Well-known fixed and trained rule based approaches are used for comparisons.

VI. EXPERIMENTAL RESULTS

We tested our feature extraction method on moving object and they include several kinds of noise caused by illumination changes, small movement in background, and reflection but we observe some best feature extraction for recognizing moving object and calculated the FAR, FRR, EER and the finally the EER of feature extraction as shown in table 1.and the linear graph as shown in fig 2.

Sl. No.	Feature Extraction	EER
1	SURF	0.1535
2	Automatic Cropping	0.1799
3	Height & weight	0.2077
4	Connected Component	0.2106
5	Segmentation	0.2428
6	SIFT	0.3491
7	Blobs Demo	0.3572
8	Hierarchical Centroid	0.9651
9	PCA	1.8825
10	Hough Line	3.061

Table 1: EER Table

Fig. 2: EER Chart

VII. CONCLUSION

In this paper all the main technology of object recognition has been addressed. These includes object detection methods, feature extraction, object classification using classifier. Most commonly used and well organized methods for these have been explained in details. Different method of object recognition like Segmentation, SIFT, SURF, Automatic Cropping etc. In which the best accuracy for object recognition is SURF However, no algorithm is perfect so in our method since it need improvements in handling darker shadow object image, suddenly illumination changes and occlusion of object. Higher level semantic extraction approach would be support for object recognition step to enhance the result and eliminate inaccurate segmentation. Though the lots of work has been done in this field there many more challenges in this research area, especially in recognizing the skilled object with efficient results. In the research which we could develop or improve upon in future work.

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REFERENCES

[1] I-Kuei Chen; Chung-Yu Chi; Szu-Lu Hsu; Liang-Gee Chen "An Integrated System for Object Tracking, Detection and Online Learning with Real-Time RGB-D Video" IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), Pages: 6558 6562, DOI: 10.1109/ICASSP.2014.6854868,2014.
[2] Chia-Hung Yeh;Chih-Yang Lin; Kahlil Muchtar; Hsiang-Erh Lai; Ming-Ting sun" Threepronged Compensation and Hystersis Thresholding for Moving Object Detection in Real-Time Video Surveillance", IEEE Transaction on Industrial Electronics page 1-1,DOI 10.1109/TIE.2017.
[3] M.Yokoyama; T.Poggio "A contour based moving object detection and tracking" IEEE International Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance, Pages: 271, DOI: 10.1109/VSPETS.2005.1570925.
[4] ShujiZhao, Fr'ed'eric" STTK-Based video Object Recognition" Proceedings of 2010 IEEE 17th International Conference on Image Processing,
[5] Engineering and Applications (IJCSEA) Vol.4, No.2,2014
[6] M.Yokoyama; T.Poggio "A contour based moving object detection and tracking" IEEE International Workshop on Visual Surveillance and Performance Evaluation of Tracking and Surveillance, Pages: 271-276, DOI: 10.1109/VSPETS.2005.1570925,2005.
[7] I.Cohen; G.Medioni "Detecting and tracking moving objects for video surveillance", IEEE Computer Society Conference on Computer Vision and Pattern Recognition (Cat. No PR00149), Pages: 325 Vol. 2, DOI: 10.1109/ CVPR.1999.784651, 1999..
[8] AmanDeep, Monica Goyal. "Moving Object Detection Techniques" IJCSMC, Vol. 4, Issue. 9, September 2015, pg.345 – 349,2015
[9] Dong-Sun Kim * and Jinsan Kwon "Moving Object Detection on a Vehicle Mounted Back-Up Camera" Accepted: 22 December 2015; Published: 25 December 2015 Academic Editor: Felipe Jimenez,2015.
[10] Shih-Hsiung Lee; Chu-Sing Yang "A real time object Recognition and Counting System for Smart Industrial Camera Sensor" IEEE Sensors Journal ,volume pp issue 99,2017.
[11] Jinwook Oh, Gyeonghoon Kim, "A 320mW 342GOPS Real-Time Moving Object Recognition Processor for HD 720p Video Streams", IEEE International Solid-State Circuits Conference, Pages: 220-222, DOI: 10.1109/ISSCC.2012.6176983,2012.
[12] Lu Changhua; Chang Ningning; Fang Rui; Liu Chun,"A Novel Algorithm for Moving Object Recognition based on Sparse Bayesian Classification" Processing, Pages: 135-139, DOI: 10.1109/MLSP.2006.275536,2006.
[13] Weijie Zhou; Yasuyuki Miura" Denoising method using a moving-average filter for the moving object recognition of low illuminance video image" IEEE International Conference on Consumer Electronics-Taiwan(ICCE-TW) Pages 1-2 DOI 10.1109/ICCE-TW.2016.7521023,2016.
[14] Sachin V. Sinkar, Ashwini M. Deshpande "object recognition with plain background using ANN and SIFT features" IEEE conference ISBN 978-1-4673-7758-4 DOI: 10.1109/INFOP.2015.7489450,2015.

