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RESEARCH ARTICLE OPEN ACCESS

Detection, Tracking and Counting of Moving Pedestrian

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ABSTRACT
Object detection systems are generally used to analyze and describe the motion of objects. Moving object detection and video tracking capture events in the scene. The aim is to use a top level application to track, identify and count moving objects. Pedestrian tracking algorithm will be used as a time frame difference to detect moving objects that move through specific area using CCTV. The system is capable of counting different objects in a streamed video.
Keywords– object counting, moving objects, tracking, moving car, smart CCTV.

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I. INTRODUCTION

In the field of computer vision, the tracking of moving objects in video pictures has brought so much interest and attention. In a real-time environment, tracking anobject is significant because it helps in various ways such as ensuring better security with the essence of visual information. Researchers in the computer vision field have taken a lot of interest in the significant problem of tracking. In a frame of a video, there should be a consecutive correspondence between objects parts and objects, which anobject is being tracked. In the applications of surveillance, it is an important task to perform because it provides data that is cohesive temporal regarding the moving objects, and this data is used to do various things like motion segmentation, as well as, behavior recognition so that activity is properly analyzed. The tracking of a moving object is a task, where a moving object is located at the time when he is moving around. The video frames are analyzed by an algorithm, along with showing the output of location regarding the moving target. The primary issue with the video tracking process is to link consecutive video frames with the target locations, especially when the frame rate is slower, whereas the objects movement is faster. A motion model is generally employed by the video tracking systems, which gives a clear description of how there might be a change in the target's image when the purpose is to track the object's different possible motions.

II. RESEARCH PLAN

2.1 GAUSSIAN MIXTURE MODELIN OBJECT DETECTION

The parametric probability density function is represented through the Gaussian Mixture Model (GMM), which is a weighted sum for the densities of the Gaussian component. The good thing about GMMs is that these are used in a probability distribution of the parametric model regarding the biometric system features, like tracking a video object on the basis of color or continuous level of measurements.

When the Gaussian Mixture Model is used as a background model in the process, the required video is able to get the required results when the video is deleting the frame pixels. There are various factors involved when background subtraction is applied, which also helps in developing a new kind of algorithm that has the ability to do detection of the required object. And it should have a capability to give reaction to different changes such as starting, illumination, as well as, stopping of the objects, which are moving.

i. Background Subtraction

The background Subtraction's steps are given below:

1) Preprocessing

The Spatial or temporal smoothing has been used when the early stage of preprocessing is handled so that device noise is eliminated, which is considered to be a factor, which comes under the light intensity in different aspects. Various other kinds of elements are removed by using the essence of the smoothing technique, especially in a type of environment, when there is snow or rain. The frame rate along with frame size is generally adopted in real-time systems so that the rate of data processing is reduced. The data format is another major method, which is associated with the preprocessing stage, which is used by the model of background subtraction. The luminance intensity can be handled by the most algorithms, which comes in each pixel with one scalar value.

2) Background Modeling
In this step, a new video frame is primarily used to that the background model is not only updated, but it is calculated as well. The development of the background model comes with a primary objective, which is to show robust against the background's environmental changes; however, there is should be enough sensitivity so that all interested moving objects are identified.

3) Foreground Detection
In this particular step, the pixels given in a frame are identified. It is important to understand that the background model is compared with the video frames when foreground detection is used, and this process also identifies the foreground pixels of the candidate from a given frame. There is one commonly used method for the foreground detection checking, which is to look at the significant difference of the pixel with its estimation of the corresponding background.

4) Data Validation
In the end, any pixels are eliminated at this stage, which has a connection with the image. The foreground mask is improved with the help of this step on the basis of the information, which is taken from the model that is outside background model.

2.1.2. Gaussian Mixture ModelAlgorithm
To get a better and improved understanding of the algorithm, which has been used for the subtraction of background, there are certain steps followed, which are essential in order to get the required results from the process. Here are those important steps, which are given below:

1. The associated components have the mean 'μ' which are compared with each input of pixels. If there is a close relationship between the mean of the chosen component and the value of a pixel, then it means that component can be taken as the one, which is properly matched. It is important for the matched component to have a less difference between the mean and the pixels as compared to the level of the standard deviation of component, which is a scale with the help of algorithm's factor D.

2. The second step is to update the mean, the Gaussian weight, as well as, deviation so that the newly obtained value of the pixel is properly reflected. When weights 'w' are analyzed with the relation to non-matched components, the weights 'w' is decreased, however, the same value is shown by the standard deviation and mean. All the dependency of the process is on the learning component, which is 'p' and having a relationship like what is the rate of their changes
3. The third step in this regard is the identification of components, which are associated with the background model. To handle this process, the component weights '*w*' is used by the application of threshold value.

4. The fourth and last step in this process is determining the foreground pixels. In this step, the pixels, which come with the identification as foreground, are not matched with any kind of determining components so that they are taken as the background

2.2. BLOB ANALYSIS
To handle the process of image processing, the identification of a blob is done as a region, which is connected with pixels. So, when these regions are studied and identified in an image, this process is called the Blob analysis. The pixels are discerned by the algorithm by their value so that they are placed in any of the two given categories; the background category or the foreground category.

The blob analysis with the typical applications, the calculation of blob features is done, which is perimeter and the area.

The purpose of using blob analysis is to find the blobs, which come up with spatial characteristics for the satisfaction of certain criteria. There is a various application, where the computation is considered to be a time-consuming process, the usage of blob analysis is advised for the elimination of blobs which are not needed due to their spatial characteristics, which means that only relevant and important blobs are kept to continue with the analysis process. The statistical information can also be found with it like the number of blob sizes, the blob regions with their presence, as well as, locations.

A. Blob Analysis Concept
It is vital to understand that an entire image is scanned through with the help of a typical blob analysis, and all the relevant blobs or particles are properly detected in the image, which develops a comprehensive report made for each particle. In this kind of report, generally, 50 information pieces are contained regarding the blob, such as the location of the blob in the orientation, shape, and size with other blobs, moments of inertia, and longest segments.

B. Blob Area Analysis
The number of pixels, particle area without any holes along with the area parameters is given below

with their description where units of particle areas are also given.
The real units are used to express the area of a particle on the basis of image spatial calibration. This kind of value is certainly equal to the pixels with its number, especially when the calibration of spatial is given as 1 square unit represented by the 1 pixel

III. CONCLUSION

An object tracking algorithm has been proposed for the video pictures on the basis of blob analysis and GMMs on given frames in the context of simple feature space. The algorithm suitability is verified by the simulation results taken for the frame sequences when they are coming with the sequence of moving object view, which means that the algorithm is reliable in terms of tracking moving objects.

The algorithm is made more robust with the help of GMM, which means that tracking will be recovered by the tracker of there is any occlusion.

The background subtraction algorithm is used to detect the moving objects on the basis of Gaussian mixture models. The application of morphological operations is done for the resulting foreground mask so that noise is eliminated.

Figure 1 .Original image

Figure2. Feature extracted image

Figure3. Removed image

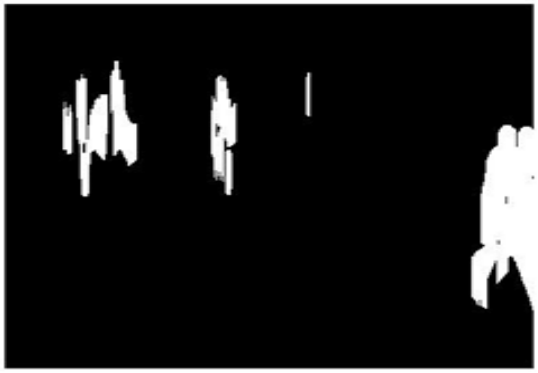

Figure4. Imdilated image

Finally, the groups of connected pixels are detected using the blob analysis, which will show a correspondence to the moving objects.

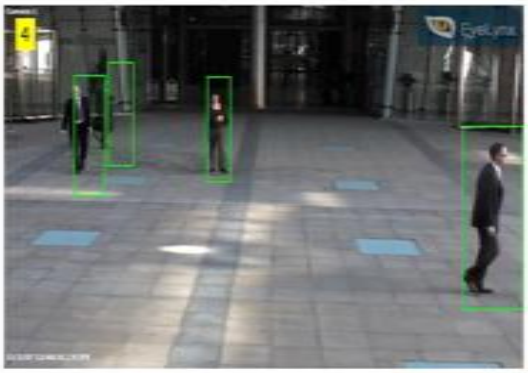

Figure5. Detection and Counting object

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