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To Detect and Track Moving Object for Surveillance System

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ABSTRACT : Recently, there has been increased need and interest in ”video analysis” which is analysis of video in sequence to determine relatively moving objects like vehicles and different behaviors of people. for eg . this can be used in CCTV network to detect and track abnormal behavior of some people or vehicles. The proposed system, can apply in home and business surveillance system to detect and track moving objects. and also differentiate that, the detected objects are either vehicle or human beings.

It is necessary that video surveillance system must detect and track moving object robustly against disturbances birds, trees, environmental changes like different weather conditions etc. so the proposed method is using color background modeling with sensitivity parameter(delta)to remove noises and to detect and track moving objects very easily. Also haar like feature extraction method is used in object recognition. Blob labeling is also used for grouping of moving objects. Then morphological operations like dilation and erosion is also used to remove noises under surveillance. Finally the experiments shows that the proposed method has the robustness against the environmental disturbances and speed which are suitable for the real-time surveillance system.

Keywords : surveillance, distributed system, background detection, morphology, group tracking, haar cascade features extraction.

I. INTRODUCTION

In many public places such as airport, parking lots, train stations, and banks there is need of surveillance to prevent the accident or harmful incident so that surveillance cameras are installed in such places. To take advantage of the video in realtime, human must monitor the system continuously in order to alert security offers if there is an emergency. The need for intelligent video surveillance systems which can monitor and respond to situation in real time have increased due to the high-cost and low efficiency of the existing surveillance system. Object tracking having aim to obtain a record of the moving object one or more targets over time and space. By locating and tracking moving objects in a video sequence in real time, we can develop a real time alert system to enhance current surveillance system.

In this paper, detecting and tracking robust algorithm for moving object of intelligent video surveillance system, is proposed . This is suitable for the real-time surveillance system, because it has fast computation and it is robust against environmental disturbances. By using mathematical model background color modeling is performed also image binarization and morphological operations are performed for removing noises from the extracted image in detection of moving objects. Tracking algorithm is using the prediction about position of each moving group and recognition of same group and the identification of newly appearing group and disappearing groups. Efficiency and applicability of the proposed method through some experiments is proved.

II. RELATED WORK

Extraction of moving regions from sequential images is carried out by using BM. This kind of BM involves the loss of information compared with color background. gray-scale BM, which shows the image information is excessively attenuated[5].Multiple object tracking with kernel particle filtering is not suitable for the real time surveillance system because of its high computational cost[1].Tracking and Object Classification for Automated Surveillance In above method gaussion mixture model(GMM) and expectation maximization (EM) is used .they can not track the moving objects smoothly when the objects are hidden by obstacles or the background

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has the colors similar to theirs or occlusion occour [7].So the proposed method is employed because it has robust algorithm to detect and track moving object and again applied haar like feature extraction method to recognize the detected objects are human beings and not the vehicles. here in the proposed method we are considering database containing videos. that videos are converted into number of frames. And these frames are considered as input to the detection algorithm. and then tracking algorithm is applied.

The main purpose of this project is to develop robust algorithms that can automatically detect and track moving objects.as such algorithms tend to be computationally intensive,thus we also want to optimize the accuracy while keeping the computational complexity low while using in real-time. occluded vehicles, poor object detection in different weather conditions, and decreased quality of data are the major challenges.

III. MOVING OBJECT DETECTION

There are two stages involved in moving object detection procedure. One is extraction stage based on color background modeling i.e. RGB background modeling , morphological operations. and second stage is grouping of moving objects which is based on blob labeling.

A. Selection of moving objects

In general extraction of movable region from sequential images is carried out by using gray level background modeling but in this procedure loss of image information is occurred as compared to color background modeling. In this paper RGB background modeling method is employed which prevent excessive loss of information. also it will take less time for computation. But one drawback is that it is very sensitive to even small change in light scattering or reflection occurs. So to remove this drawback new parameter is developed i.e. sensitivity parameter which is denoted by delta (δ).

$$\begin{bmatrix} M_i(x,y) \\ N_i(x,y) \end{bmatrix} \triangleq \begin{bmatrix} \min\{V^z_i(x,y)-\delta\} \\ \max\{V^z_i(x,y)+\delta\} \end{bmatrix} \quad (1)$$

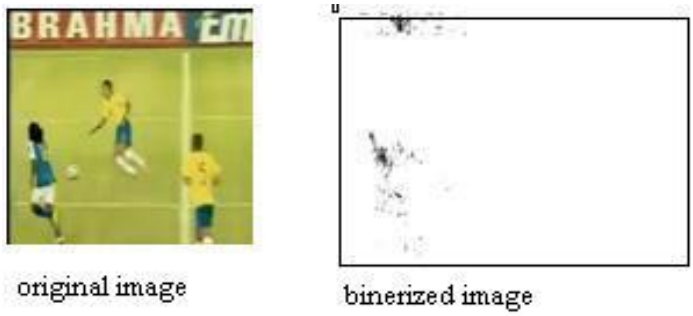

Figure 1: binerization of input frame

I ={ r, g, b}, 0 <= δ <= 255.

Where V^i_z s are the corresponding RGB-values of the z^{th} input image. from the result of RGB color model with δ the change of color tone in each pixel B the sequential images $V^i_z(x, y)$ is obtained by following equation.

$$B^z_i(x,y) \begin{cases} V^z_i(x,y) & \begin{cases} V^z_i(x,y) > p_i(x,y) \\ V^z_i(x,y) < q_i(x,y) \end{cases} \\ 0 & \text{else} \end{cases} \quad (2)$$

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Moving region is selected by using equation (2) are affected by the sensitivity parameter. To obtain clear image this sensitivity parameter can be adjusted. The δ must be greater to remove noises like different weather conditions or leaves or other environmental disturbances etc.

Then from selected region frames are obtained. these frames are binerized to remove the additional noises. To detect image more accurately from the crowd of pixel morphological operations like erosion and dilation operations are applied on the binerized images which are calculated by equation (3)

$$BIN^{Z}_{i}(x,y) = \begin{cases} 255, & 0 < B^{Z}_{i}(x,y) \\ 0, & \text{else} \end{cases} \qquad (3)$$

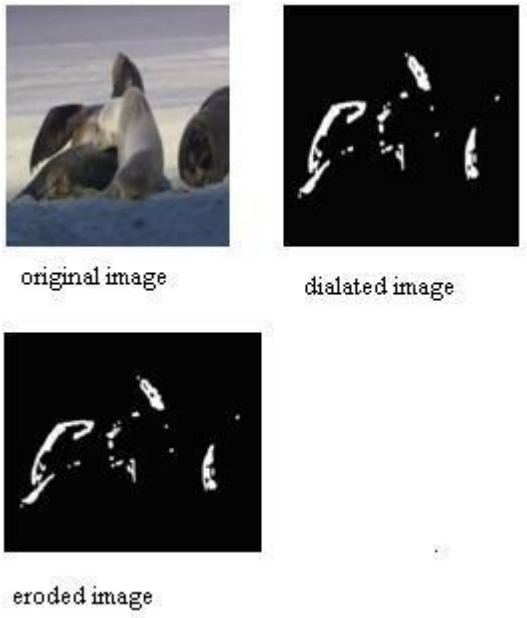

Figure 2: morphological operations

Elimination of natural objects are done by morphological operation so it is helpful for the detection.

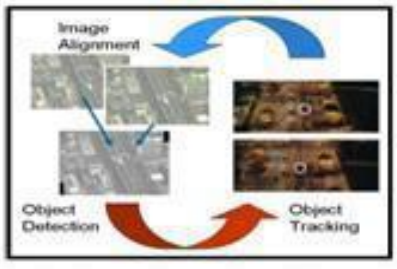

Figure 3: detection of moving object

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B. Grouping of moving object

When moving object is selected by the color background modeling its performance degrades and morphology is tracked individually because there may be occlusion occurred. here in this paper group tracking is used to remove the problem of misidentification. Grouping scheme is required to classify moving object into several object. Blob labeling is used to group moving object which required less computational cost also it is easily implemented.

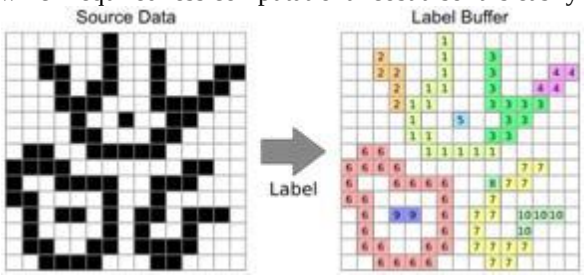

Figure 4: blob labeling

IV HOW TO TRACK MOVING OBJECT ?

This section deals with the procedure of tracking the groups detected in the previous section. The procedure consists of predicting the position of each group, recognizing the similarity of each group in the sequential frame and identify appearing and disappearing of new group.

A.Mathematical model

Based on the predicted information, the similarity between previously defined group and recently identified group is determined. That is current position of group is closest from predicted position of group. When a new group appears or the existing group is divided, new n-h identification(ID) are given to the group whose similarity is not verified. When the existing group is disappears or is combined with other group, the current group inherit ID from previous group with similarity and other h-n ID are discarded.

V. PROGRAMMER'S DESIGN

The Experimental setup for proposed detecting and tracking method is implemented as shown below.

A. System Implementation

1. Here we are using video as a input. That video is converted into number of frames.

2. Then calculate the median and standard deviation of input image. so that we can easily detect the moving object.

3. Color background modeling is applied to the frames. Here we have to consider sensitivity parameter for accurate object detection.

4. convert that image into binerized form and apply morphological operations like erosion and dilation for removing noises and getting cleared image.

5. Then sequential numbering is applied to the detected image we can call it as blob labeling. It is used to trace the grouping of objects.

6. Then tracking algorithm is applied, in that its direction and standard deviation is calculated.

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7.In this stage haar cascade database is used to check the real time face detection. so that it will recognizes that the detected moving object is the human being and not the vehicle of birds.

B. Experimental Result

The average cost time of the proposed algorithm for per frame will less than previously invented method. So we can say that it is enough speed to apply to the real time surveillance system.

VI. CONCLUSION

In this paper, we propose a technology detecting andvtracking multiple moving objects, which can be applied in home and business surveillance system consisting of static camera. The robustness and speed of the proposed method is verified through experiments. Because of the robustness of the algorithm the proposed method is used in real time surveillance system. proposed method is used to separate the crowd of person count from vehicle among the moving object. further research for, which makes it possible to monitor a wide range area with minimum number of cameras and track a particular moving object among many ones.

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