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A NOVEL APPROACH FOR CLASSIFICATION OF MOVING OBJECT WITH GCM AND PCA-GCM METHOD

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Abstract: In this paper, we propose a new tracking method that uses Gaussian combination Model (GCM) and PCA-GCM approach for traffic object tracking. The GCM approach consists of three different Gaussian distributions, the average, standard deviation and weight respectively. This paper combines the GCM and PCA-GCM for object tracking. The advantages of is to tackle tracking of moving object based on PCA-GCM together with Kalman prediction of the position and size of object along the image's sequence. The advantage of GCM is complete results of the process the disadvantage is not a complete object tracking, GCM result of the operation complete but disadvantages include computing for a long time with high blare. The GCM and PCA-GCM can complement each other and image segmentation results in the successful tracking of objects. It has variety of uses such as compression of video and images, object rule.

Keywords: Image sequence, GCM, PCA

I. INTRODUCTION

The moving object tracking in video pictures has attracted a great deal of interest in computer vision. Object tracking is the first step in surveillance systems, navigation systems and object recognition. There is a huge significance of object tracking in real time environment as it enables several important applications such as to provide better sense of security using visual information, Security and surveillance to recognize people, in treatment to improve the quality of life for physical treatment patients and disabled people, to analyze shopping behavior of customers in retail space instrumentation to enhance building and background design, video construct to obtain routine marginal note of videos, to generate object based summaries, traffic management to analyze flow, to object fault, video restriction to do away with cumbersome human worker communication, to design innovative video possessions. Tracking is a significant and difficult problem that arouses interest among computer apparition. The purpose of tracking is to set up correspondence of objects and object parts between consecutive frames of video. It is a significant task in most of the surveillance applications since it provides cohesive temporal data about moving objects which are used both to enhance lower level processing such as motion segmentation and to enable higher level data extraction such as behavior recognition and activity analysis. Tracking has been a difficult task to apply in congested situations due to inaccurate segmentation of objects. Long shadows, full and partial occlusion of objects with each other and with stationary items in the scene are some of the common problems of erroneous segmentation. For robust tracking it is important to dealing with shadows at motion detection level and coping with occlusions both at segmentation level and at tracking level.

Tracking in video can be categorized according to the needs of the applications. It is used in or according to the methods used for its solution. There are two common approaches in tracking objects as a whole: one is based on correspondence matching and other one carries out explicit tracking by making use of position prediction or motion estimation. On the other hand, the methods that track parts of objects (generally humans) employ model-based schemes to locate and track body parts. Some example models are stick figure, Cardboard Model, 2D contour and 3D volumetric models combine motion estimation methods with correspondence matching to follow objects. It is also able to follow parts of people such as heads, hands, upper body and feet by using the Cardboard Model which represents relative positions and sizes of objects. It keeps form templates of entity objects to handle matching even in merge and split cases. In this paper the algorithm uses Gaussian

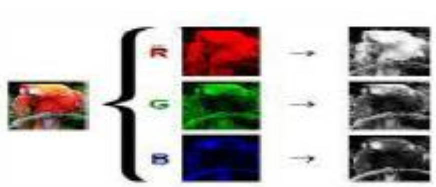
Mixture Model, a background modeling method to extracting moving objects and for trajectory prediction. Moving object tracking is the process of locating a moving object in time using a tool. An algorithm analyses the image frames and outputs the location of moving targets within the image frame. The main difficulty in video tracking is to associate target locations in consecutive image frames, in particular when the objects are moving fast relative to the frame rate. Here, object tracking systems usually employ a activity model which describes how the image of the target might change for different possible motions of the object to track.

II. COLOR EXTRACTION

A color image is comprised of three basic colors which are Red, Green and Blue. So each pixel of a color image can be broken down into Red, Green and Blue values. As a result, for the entire image 3 matrices are obtained, each one representing color features. The three matrices are arranged in sequential order, next to each other creating a 3 dimensional m by n by 3 matrixes. The three basic colors can be used to extract other color components from the image. They can be extracted using the following equations.

R=image(: , 1 ,:) G=image(: , 2 ,:) B=image(: , 3 ,:)

The below figure shows the extraction of three basic components using the above equations.



This paper mainly deals with tracking institutional buses which are yellow in color. Yellow is obtained by the combination of red and green colors. After extracting the basic components yellow color components of the image are extracted using R, G and B components using the following equation.

Y= ((R+G)/2)-B

III. OBJECT DETECTION USING GAUSSIAN MIXTURE MODEL

A Gaussian Mixture Model (GMM) is a parametric probability density function represented as a weighted sum of Gaussian component densities. GMMs are commonly used as a parametric model of the probability distribution of continuous measurements or features in a biometric system, such as color based tracking of an object in video. In many computer related vision technology, it is critical to identify moving objects from a sequence of videos frames. In order to achieve this, background subtraction is applied which mainly identifies moving objects from each portion of video frames. Background subtraction or segmentation is a widely used technique in video surveillance, target recognitions and banks. By using the Gaussian Mixture Model background model, frame pixels are deleted from the required video to achieve the desired results. The application of background subtraction involves various factors which involve developing an algorithm which is able to detect the required object robustly, it should also be able to react to various changes like illumination, starting and stopping of moving objects.

The Gaussian models of object speed

IV. THE GAUSSIAN MODELS OF OBJECT SPEED

In a given position of an image, the car can be distinguished by the size feature easily. In order to further recognize the bicycle, in each pixel, to say p(x; y), two Gaussian models are established to represent the speed distributions of bicycles and pedestrians,

$$\eta_v(p(x,y),\mu_i,\sigma_i) = \frac{1}{(2\pi)^{\frac{1}{2}}\sigma_i} e^{-\frac{(x-\mu_i)^2}{2\sigma_i^2}} \quad , \quad i = 1,2$$

Where $\eta_v(p(x,y),\mu_i,\sigma_i)$ is a Gaussian probability density function, μ_i and σ_i^2 i are the corresponding mean and variance. The distribution which has a larger speed is the speed distribution of object.

V. PROPOSED WORK

Combine the GCM with the PCA-GCM method we can obtain the results of moving object tracking. We have to combine the advantages of GCM and PCA-GCM. One of the key tasks in a tracking scheme is to bring up to date the object model. In most of the object tracking framework, the underlying image data, the object, and the scene, evolve over time in a sequential way. In such scenarios, the assumption of a constant object or background model over the entire sequence will lead to an insolvent tracker which cannot handle photometric differences. Therefore it is essential to learn the object model and adapt accordingly.

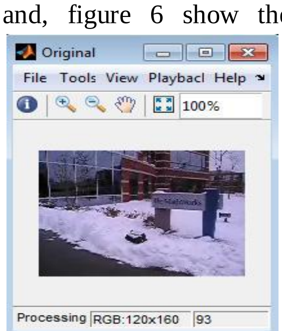
- Preprocess: captured with moving objects of interest
- Implement: determine the image regions
- Combine GCM and PCA-GCM algorithm.
- Image extraction.
- Result: an delineate of image sequence.

In the GMM case, the bands are supposed to be correlated and it requires the estimation of K covariance matrices for the K multidimensional Gaussian distributions. However, in a non-Gaussian context, multidimensional pdfs are quite hard to obtain. One can deal with multivariate versions of classical distributions. But they are very few and impose all margins to be from the same family (e.g. Gamma margins for a multidimensional Gamma distribution). Another solution consists of using tools from multivariate data analysis such as Principal Component Analysis (PCA) which considers correlation between bands. However, PCA estimates the principal component and not the marginales.

VI. RESULTS

In this section, we show experimental results of the proposed object tracking method. The proposed algorithm would be implemented in MATLAB 7.14. The object video

sequences come from standard camera which is publicly available; the size of the video sequences is 480×320 pixels. Figure 2 show the original video and, figure 6 show the object tracking results,



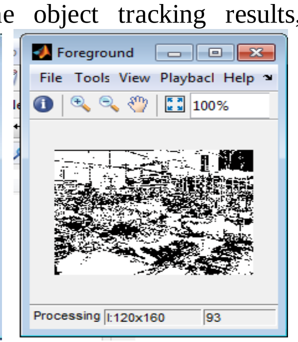
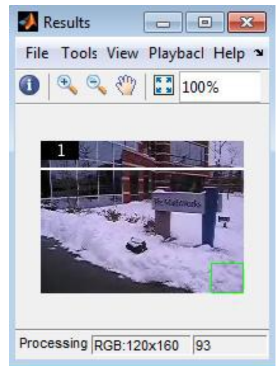


Fig: 1 real Image Fig: 2 Segmented image



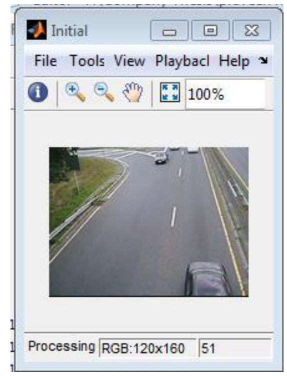
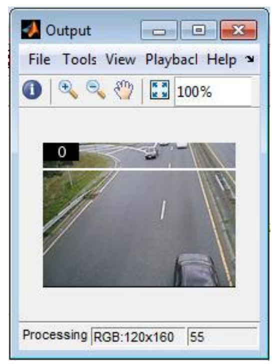


Fig: 3 After noise in GMM Fig:1 Actual Image



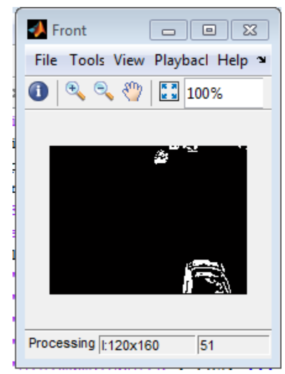
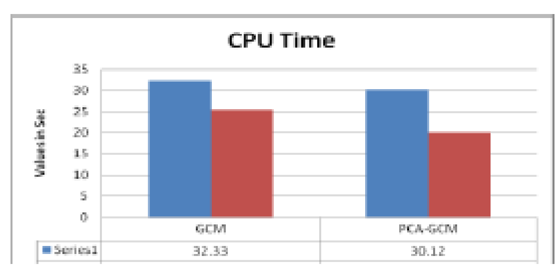


Fig:2 Shows the Segmented image with noise Fig: 3 Result After noise in PCA- GMM

Comparision Table

CPU Time	GCM	PCA-GCM
Video1	32.33	30.12
Video2	25.54	20.13



VII. CONCLUSION & FUTURE DIRECTIONS

In this paper, we proposed the GCM and PCA-GCM method successfully applied in a continuous image. We used the GCM approach as the main algorithm, with image features and segmentation to remove noise. The success of the foreground and background segmentation and found the object coordinates. On the other hand, we used PCA-GCM method has shown to provide the projections that capture the most relevant pixels for segmentation of moving object within the background models relative to GCM. Based on this new method we address the tracking problem of moving objects by using KF algorithm. PCA-GCM used to subtract successive images, also using good segmented algorithm to remove noise. Due to PCA-GCM method tracking object incompletely, supporting the main algorithm GCM, the proposed method there is still room for improvement. In each case the tracking performance is based under sequence of images which are successfully generated by segmentation provided by PCA-GCM method We can replace the PCA-GCM method, fill the emptiness produced by the phenomenon of GCM, but the best algorithms in the future still need more testing to be able to get the perfect result. In future this method can be modified to differentiate different class objects in real time video. Later characteristics are extracted and applied to a Neural Network so that segmented objects are classified as vehicles and non vehicles and, in the case of vehicles, they will be classified according to the size of the vehicle as follows: large size, intermediate size, small size.

VIII. References

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