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MOVING OBJECT IDENTIFICATION USING ADVANCED ALGORITHM FOR VIDEO SURVEILLANCE

Karthika Menon and Ismayil Siyad
ECE Department, MEA Engineering College, Perinthalmanna, India
E-Mail: karthikamenon.me@gmail.com

ABSTRACT

Surveillance systems in real world limited bandwidth network face troubles due to obstruction in network. This created the necessity of a sophisticated algorithm that may be utilized in real time applications. This paper implicates principal component analysis based radial basis function for motion detection. Implementation in real world applications is the major goodness of this technique. This algorithm is preferable with variable bit rate video streams which makes wireless video communication at ease. Once the moving object detected human presence is known that widens the relevance of this method. This methodology is favorable for its effectiveness.

Keywords: motion detection, variable bit rate, human identification, real time application.

INTRODUCTION

Video surveillance has become an important component in security and transportation systems. It has many use of pattern detection in their applications. Many techniques are projected in previous researches for encountering moving object detection. A new background matching structure for motion detection is enforced [1] in previous works exploiting background subtraction. Mechanism of edge localization and gradient directional masking [2] is employed to come up with background images that have issue in variable bit rate video streams.

In this paper, a new scheme that uses Principal Component Analysis based Radial Basis Function (PCA-RBF) network for moving object detection is proposed. This is applicable in variable bit rate video streams over real world with limited bandwidth networks. This mainly includes three stages, a background generation stage, moving object detection stage and human identification stage.

PCA BASED RBF NETWORK

Principal Component Analysis

Moving object detection utilizes PCA based RBF network in order to fully and accurately detect moving objects. PCA is a method that estimates a dataset to new reference by finding eigenvalues and Eigen patterns. It is concerned with computation of covariance matrix and it minimizes the redundancy. PCA is related with finding the variances and coefficients of a dataset by finding eigenvalues and eigenvectors.

For implementing PCA every image that is to be processed is converted into a vector. After image set is obtained, mean image is recognized. Input image and mean image difference is calculated. The result is used to find covariance matrix which helps in finding Eigen vectors and eigenvalues and principal components are selected.

Radial Basis Function

Radial Basis Function is a real values function whose value depends only on the distance from the origin. Sums of radial basis functions are used to approximate given functions. This approximation process can also be taken as simple kind of neural network. Radial basis functions are generally used to develop function approximations.

Moving Object Detection

Moving object detection in this paper is done using an advanced algorithm that uses analysis based radial basis function network as its principal component. This approach is applicable in variable bit rate video streams as well. It primarily consists of three stages, background generation stage, moving object detection stage and human identification stage.

Background Generation Stage

Video is a combination of multiple frames. Lower dimensional Eigen patterns are found from incoming frame to support the properties of variable bit rate video streams during the discriminative feature extraction process. Every incoming frame is segmented into NxN size blocks, from which scatter matrix is calculated. By the utilization of PCA technique, optimal projection vectors are obtained from which lower dimensional Eigen-patterns are generated and background model image is created. With the alteration in the incoming pixel, background model image is updated and hence it is an adaptive background model process. Difference between frames is determined by Euclidean distance in the incoming video so that background can be updated.

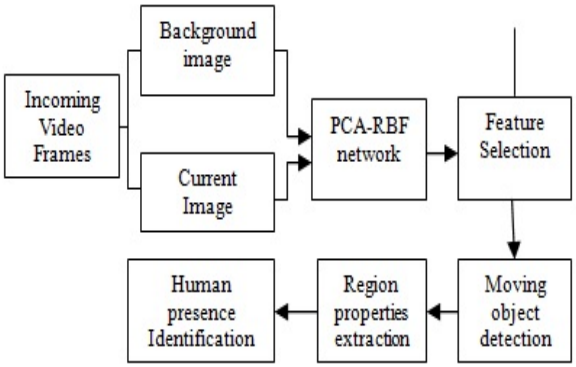

Figure-1. Block diagram of proposed work.

Moving Object Detection Stage

Once background generation is completed, moving object detection process is met out. Lower dimensional Eigen patterns of incoming frame are calculated. The Euclidean distance between Eigen patterns of background model image and incoming frame is calculated and compared. From this moving pixels are found out. Radial basis function is employed to specify output of neurons in a neural network. Hermite function is chosen for basis function. The exact pixels containing moving objects are determined in this stage and moving objects are detected in the incoming video.

Human Identification

After the moving object detection stage, human identification stage is completed. Binary object detection masking is found at the pixels categorized as moving. Comparing with a threshold pixels are assigned values 0's and 1's so that a binary image is obtained. Then processing is completed in this binary image. Region containing moving objects are extracted from the binary image and region properties are derived from which human presence can be identified.

With human presence detection in the moving objects, this paper finds extensive application in security and traffic fields. The main benefit is that it is applicable to variable bit rate video streams, so wireless communication can be done in simple way. Compared to different strategies, this has minimal error without using a filter and hence efficient.

EXPERIMENTAL RESULTS

As per our experiment moving objects are detected from video so that it can be used for video surveillance. Moving object detection is depicted in Figure-2 and Figure-3. Also human presence can be identified from those detected objects and that is depicted in Figure-4 and Figure-5.

Figure-2. Moving object detection (a).

Figure-3. Moving object detection (b).

Figure-4. Human presence identification.

Figure-5. Vehicle recognition.

CONCLUSIONS

This paper uses advanced algorithm based on PCA-RBF network for moving object detection. Also human presence is specified after the moving object detection process which widens the applicability. This technique is compatible with variable bit rate video streams which helps in easy wireless video communication in real world.

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