isrjournals

International Journal of Advanced Research in Computer Science Engineering and Information Technology

Volume: 4, Issue: 3,Special Issue: 2 ,Apr,2016 ,ISSN_NO: 2321-3337

Vision Based Home Security System Using Support Vector Machine

Nivetha. R[1], Panimalar. B[2], Dr. R. K. Selvakumar[3] ,SMIEEE

Student, Department of Computer Science and Engineering, Agni College of Technology, India[1,2]

Professor, Department of Computer Science and Engineering, Agni College of Technology, India[3]

ABSTRACT *- Home security is one of the application in which image is processed in order to detect the human presence to protect one's asset from the housebreaker. Object detection technique is used along with classification to classify the human and non-human entity using SVM (Support Vector Machine) which is discriminative classifier. Before classifying the object, the image is enhanced; moving object is detected and then segmented. After that the boundary features of objected is extracted from the segmented image. These features are stored in a database. For classification of human and non-human entity such as cat and dog, we use SVM Classifier. It can be handled with both linear and non-linear classification and can classify the categories accurately. This solution is generic and can be used for various applications which require detection and classification of an object.*

KEYWORDS- **Support vector machine, Histogram equalization, Canny edge detection, feature extraction, classification.**

1. INTRODUCTION

Home security is something applicable to all of us and involves the hardware in place on a property, and personal security practices. The hardware would be the doors, locks, alarm systems, lighting that is installed on your property. Personal security practices would be ensuring doors are locked, alarms activated, windows closed and many other routine tasks which act to prevent a burglary. One requires security in every aspect of our life as the morals of the people at

present have completely diminished. There is no guarantee for a prosperous life. In order to save lives, it is important to install security everywhere. This research work reports the situation of security at home. There could be many incidents that could take place in our homes where one would require home security equipments in order to get away with the trouble that might cause lots of loss.

2. EXISTING SYSTEM

- In the existing system, the survey of the literature papers [1-5] discussed below exhibits that object is detected & identified accurately excluding noises & distortions by using feature extraction technique.
- The features are identified in order to detect the objects & differentiate multiple objects. Based on the feature vectors classification is done. There is no classification provided for human and non human entity.
- The intruder attack is found only after the theft has occurred using CCTV camera. Some have used color vector for classification which is not reliable and accurate.
- No classification done on human and non-human objects.
- Non-rigid objects are not classified accurately.
- Not reliable in case of Variations in image size.
- Features selected for classification are not assured give accuracy.

3. PROPOSED SYSTEM

- Our proposed system “Vision Based Home Security System(VBHSS) using SVM” go a step ahead of the existing system by implementing the classification of human and non-human entity.
- Various image processing techniques are used as a sequence process to have an efficient outcome. An efficient approach used is SVM, a discriminative classifier in which the examples are represented as points in an hyper plane space & a classifier is set between the categories.
- SVM is primarily a classifier method that performs classification tasks by constructing hyperplanes in a multidimensional space that separates cases of different class labels.

4. SYSTEM IMPLEMENTATION

4.1 Image enhancement

The aim of image enhancement is to improve the interpretability or perception of information in images for human viewers, or to provide `better' input for other automated image

processing techniques. Histogram equalization method is used for enhancement.[6] This method usually increases the global contrast of many images, especially when the usable data of the image is represented by close contrast values. Through this adjustment, the intensities can be better distributed on the histogram. This allows for areas of lower local contrast to gain a higher contrast. Histogram equalization accomplishes this by effectively spreading out the most frequent intensity values. The Figure 4.1 shows the actual reference and current frame and the enhanced images of both.

Figure 4.1 Enhanced image

4.2 Object Detection

In this process, object such as human or other non human entities are detected from the captured image by the process of image subtraction method[7]. A motion detection algorithm begins where foreground or moving objects are detected from the background. The simplest way to implement this is to take an image as background and take the frames obtained at the time t, denoted by F(t) to compare with the background image denoted by B. Here using simple arithmetic calculations, we can segment out the objects simply by using image subtraction technique of computer vision meaning for each pixels in F(t), take the pixel value denoted by P[F(t)] and subtract it with the corresponding pixels at the same position on the background image denoted as P[B]. The equation 4-1 represents threshold relation.

$$[P[B] - P[F(t)] > \text{threshold} \qquad 4\text{-}1$$

Where threshold is a value experimentally chosen for better object detection. Figure 4.2 shows the object detected in the current frame.

Figure 4.2 Detected object

4.3 Image Segmentation

Image Segmentation is the term used when an image is split up into different regions. This can be a fairly simple task, such as separating the pixels in the image. Edge based representation of image technique is widely used for segmentation[8].

Edge detection is a well-developed field on its own within image processing. Region boundaries and edges are closely related, since there is often a sharp adjustment in intensity at the region boundaries. Edge detection techniques have therefore been used as the base of another segmentation technique. The edges identified by edge detection are often disconnected. To segment an object from an image however, one needs closed region boundaries. The desired edges are the boundaries between such objects or spatial-taxons. Spatial-taxons are information granules, consisting of a crisp pixel region, stationed at abstraction levels within a hierarchical nested scene architecture. They are similar to the Gestalt psychological designation of figure-ground, but are extended to include foreground, object groups, objects and salient object parts. Edge detection methods can be applied to the spatial-taxon region, in the same manner they would be applied to a silhouette. This method is particularly useful when the disconnected edge is part of an illusory contour.Figure 4.3 shows the edge representation of the detected object.

Figure 4.3 Segmented image

4.4 Feature Extraction

Feature extraction creates new features from functions of the original features. Feature plays a very important role in the area of image processing. Here we covert image pixels into binary format & store x & y coordinates of each pixel in the database. The length & shape

factors are also considered as features. From the coordinates values, degrees of coefficients are found using least square fitting algorithm. The method of least squares is a standard approach in regression analysis to the approximate solution of over determined systems, i.e., sets of equations in which there are more equations than unknowns. "Least squares" means that the overall solution minimizes the sum of the squares of the errors made in the results of every single equation.

The techniques used for extracting information from an image are known as Image Analysis. An image is composed of edges and shapes of grey. Edge is corresponding to fast change in grey level and corresponds to high frequency information. Shade is corresponding to low frequency information. Separation of high frequency information means edge detection. An edge or boundary in the external information of image. The internal features in an image can be found using segmentation and texture. These features depend on the reflectivity property. Segmentation of an image means separating certain features in the image. While treating other part as a background if the image consists of a number of features of interest then we can segment them one at a time. Texture of an image is quantitatively described by its coarseness. The coarseness index is related to the spatial repetition period of the local structure. Image feature is a distinguishing characteristic of an image. Spectral and spatial domains are the main methods used for feature separation.

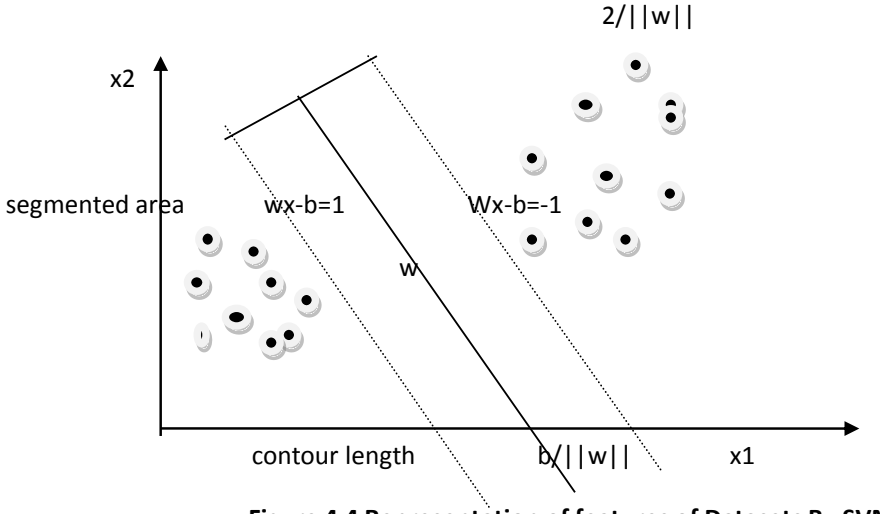


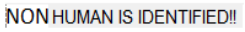
Figure 4.4 Representation of features of Datasets By SVM

4.5 Classification

Classifying data is a common task in machine learning. Suppose some given data points each belong to one of two classes, and the goal is to decide which class a *new* data point will be in. In the case of support vector machines, a data point is viewed as a p-dimensional vector (a list of p numbers), and we want to know whether we can separate such points with a $(p-1)$-dimensional hyperplane. This is called a linear classifier. There are many hyperplanes

that might classify the data. One reasonable choice as the best hyperplane is the one that represents the largest separation, or margin, between the two classes. So we choose the hyperplane so that the distance from it to the nearest data point on each side is maximized. If such a hyperplane exists, it is known as the maximum-margin hyperplane and the linear classifier it defines is known as a maximum margin classifier; or equivalently, the perceptron of optimal stability. SVM are a group of supervised learning methods that can be applied to classification or regression. Figure 4.5 represents human and non human classification result.

(a)



(b)

Figure 4.5 classification result (a) human (b) non-human

5. ARCHITECTURE DIAGRAM

5.1 System architecture

Volume: 4, Issue: 3,Special Issue: 2 ,Apr,2016 ,ISSN_NO: 2321-3337

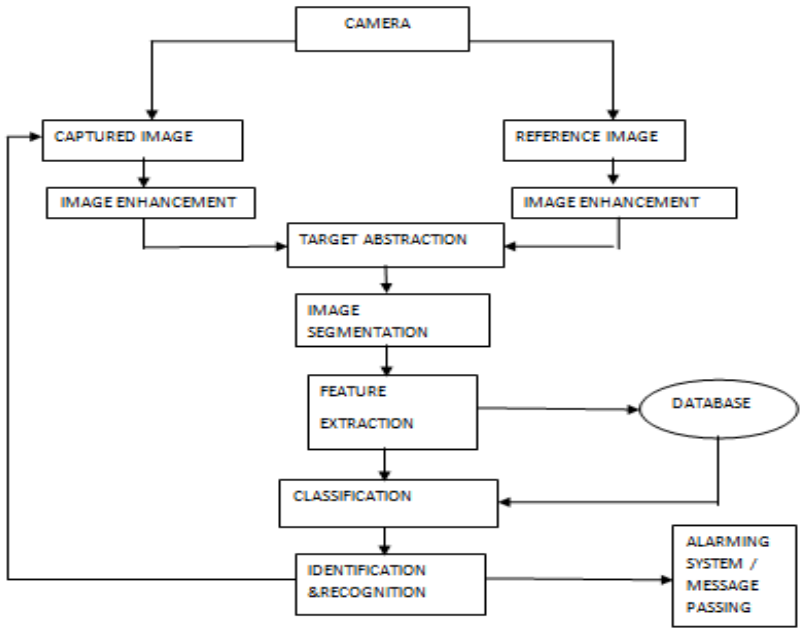


Figure 5.1 VBHSS- System Architecture

6 Conclusion

In VBHSS using SVM, we have presented SVM for classification in which the SVM classifier is learned by features. We tested our approach on random images from internet, picture taken by digital camera and achieved great deal of accuracy about 80%. In the existing approach classification is not done for human and non-human entities whereas in proposed non-deformed human entity is identified as well as certain non-human entity is also recognized. The experimental results reveal that the proposed method is much better in terms of altered circumstance. This method can be used in various other applications which requires human & non-human detection. Finally, we conclude that there is still room for improvement in classification methods.

References

[1] A. W. D. Udaya Shalika, Lasantha Seneviratne, Animal Classification System Based on Image Processing & Support Vector Machine, Journal of Computer and Communications, 2016, 4, 12-21.

[2] N. Elavarasan, Dr. K.Mani, A Survey on Feature Extraction Techniques, International Journal of Innovative Research in Computer and Communication Engineering, Vol. 3, Issue 1, January 2015.

[3] Bingquan Huo and Fengling Yin, Image Classification Algorithm based on Multi-Feature Extraction and Modified SVM Classifier, International Journal of Smart Home Vol. 9, No. 9 (2015).

[4] T. Bouwmans, F. Porikli, B. Horferlin, A. Vacavant, Handbook on "Background Modeling and Foreground Detection for Video Surveillance: Traditional and Recent Approaches, Implementations, Benchmarking and Evaluation", CRC Press, Taylor and Francis Group, June 2014.

[5] Harshad Kadu and C.-C. Jay Kuo, Automatic Human Mocap Data Classification, ieee transactions on multimedia, vol. 16, no. 8, december 2014

[6] Osameh Biglari , Reza Ahsan , Majid Rahi ,Human Detection Using SURF and SIFT Feature Extraction Methods in Different Color Spaces, Journal of mathematics and computer Science 11 (2014) 111 – 122

[7] Waseem Khan, Image Segmentation Using Edge Detection and Thresholding, Journal of Image and Graphics Vol. 1, No. 4, December 2013.

[8] Omprakash Patel, Yogendra P. S. Maravi and Sanjeev Sharma, A Comparative Study Of Histogram Equalization Based Image Enhancement Techniques For Brightness Preservation And Contrast Enhancement, Signal & Image Processing : An International Journal (SIPIJ) Vol.4, No.5, October 2013.