ISSN 2395-695X (Print)
ISSN 2395-695X (Online)

International Journal of Advanced Research in Biology Engineering Science and Technology (IJARBEST)

Vol. 2, Special Issue 10, March 2016

AUTOMATIC OBJECT DETECTION AND ENERGY CONSERVATION

S.Gogulapriya[1], L.M.Palanivelu2
M.E, Department of CSE , Velalar College of Engineering and Technology,Thindal ,Erode,Tamilnadu[1]
HOD,Department of CSE, Velalar College of Engineering and Technology,Thindal ,Erode,Tamilnadu[2]

ABSTRACT

In office environment the power is not switched off many times due to the ignorance of the personnel's working there. An effort has been attempted here to automate the monitoring of the personnel's physical presence and turn off the power in their absence. Motion sensor also known as passive infrared sensor is used in existing system to detect the motion of object. Proposed model deals with the object detection and recognition using image processing. Object recognition is an important task in image processing and computer vision. It is concerned with determining the identity of an object being observed in an image from a set of known tags. Humans can recognize any object in the real world easily without any efforts; on contrary machines by itself cannot recognize objects. Algorithmic descriptions of recognition task are implemented on machines; which is an intricate task. Thus object recognition techniques need to be developed which are less complex and efficient. In this method camera captures the image continuously. By comparing reference image and captured image, presence of human is detected. So lights, fans and other power sources can be controlled by detecting the human motion. Hence the energy is saved.

Keywords – Image Segmentation,Moving object Detection,Object Recognition,Security Systems,Human Detection.

1.INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually Image Processing system includes treating images as two dimensional signals while applying already set signal processing methods to them. It is among rapidly growing technologies today, with its applications in various aspects of a business. Image Processing forms core research area within engineering and computer science disciplines too.Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all

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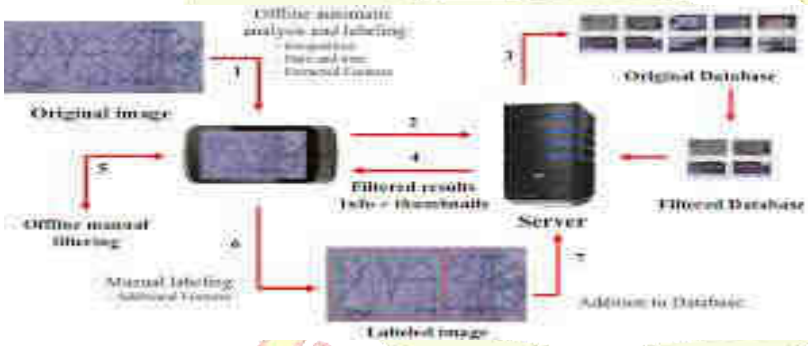
types of data have to undergo while using digital technique are Pre-processing, enhancement and display, information extraction.

Purpose of Image processing

The purpose of image processing is divided into 5 groups.

- Visualization - Observe the objects that are not visible
- Image sharpening and restoration - To create a better image.
- Image retrieval - Seek for the image of interest.
- Measurement of pattern – Measures various objects in an image.
- Image Recognition – Distinguish the objects in an image.



Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. Real-time moving object detection is critical for a no of embedded application such as security surveillance and visual tracking. In order to perform more sophisticated operations such as classification.

2. FEATURE-BASED METHODS

OBJECT DETECTION

Object detection is a computer technology related to computer vision and image processing that deals with detecting instances of semantic objects of a certain class (such as

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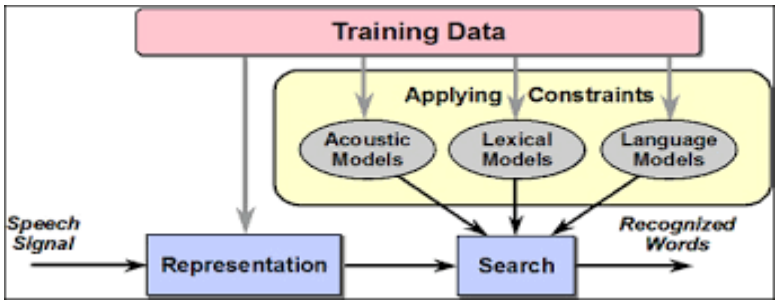
humans, buildings, or cars) in digital images and videos. Well-researched domains of object detection include face detection and pedestrian detection. Object detection has applications in many areas of computer vision, including image retrieval and video surveillance. The proposed uses a neural network to classify the extracted objects in its third and final phase. The neural network will have a defined structure with a fixed number of input layer neurons. These input neurons receive pixel values from the extracted object image. Therefore, further processing of the extracted object image is required, and it involves simple squaring of the extracted image and resizing it to assure the neural network input layer neurons receive a uniform set of pixel input values in a real life application.



OBJECT RECOGNITION

Object recognition – task (within computer vision) of finding and identifying objects in an image or video sequence. Humans recognize a multitude of objects in images with little effort, despite the fact that the image of the objects may vary somewhat in different view points, in many different sizes and scales or even when they are translated or rotated. Objects can even be recognized when they are partially obstructed from view. This task is still a challenge for computer vision systems. Many approaches to the task have been implemented over multiple decades. so analysts apply a combination of personal knowledge and collateral data to image processing..This section describes the image database, the neural network input pattern preparation, and the implementation of the neural network.

Image Database

1. Input Pattern Feature Extraction
2. Neural Network Arbitration
3. Extracted Image Squaring and Framing

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3. RELATED WORKS

Anitha.A et al., Monitoring military, conflicts, illegal immigrants etc. areas rely currently on technology and man power, however automatic monitoring has been advancing in order to avoid potential human errors that can be caused by different reasons. This introduces an automatic recognition of object, which uses image processing to detect and extract moving objects within a restricted area, and a neural network to recognize the extracted object. Experimental results provides a simple, efficient and fast solution to the problem of detecting, extracting and recognizing moving objects within one system. Automatic recognition systems for still and moving objects can be invalid in security applications, such as monitoring border areas, buffer zones and restricted areas. A simple recognition system would comprise a camera fixed high above the monitored zone, where images of the zone are captured and consequently processed.

Payal Panchal et al., Tracking and detecting of object is most popular now days and is use for motion detection of various objects on a given video or an image. The applications of object detection and tracking is farming, military, transportation, civil, security and for commercial use. Some methods commonly use in it are background subtraction, Frame difference, template matching and shape based methods. We are going to discuss issues about detection and tracking. Techniques categorized based on speed, memory requirements and accuracy. They used methods such as frame difference technique, Real time background subtraction and shadow detection technique, adaptive background mixture model for real time tracking technique. They used algorithms ranges from varying levels of accuracy and computational complexity. Some of them can also deal with real time challenges like snow, rain, moving objects.

4. PROPOSED FRAME WORK

A) Proposed solution model and assumptions

The camera would constantly capture the image. The captured image is continuously compared with the set of reference image to find the absence of human. Once the absence of the object is conformed the devices used are turned off, to conserve energy. This is achieved by computer vision toolbox in Matlab. Using the Computer vision tool box the detection of the single object detection in a simpler and faster way is achieved. The goal of this project is to detect an object in a live video in small time and at faster rate. In order to achieve this SURF function in MATLAB is used, video is fed by a High Definition Camera. The video is input by the High Definition

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Camera, which is then divided into Number of frames. These frames are then converted into RGB GRAY format.

B) Steps In Object Detection

Step 1:
Read Source Image.

Step 2:

Read reference Image.

Step 3:

Detect Feature Points in both images.

Step 4:

Visualize the strongest feature points in both images.

Step 5:

Extract Feature Descriptors in both images.

Step 6:

Find Putative Point Matches.

Step 7:

Display putatively matched features.

Step 8:

Locate the Object in the Scene Using Putative Matches.

Step 9:

Display the matching point pairs with the outliers removed.

Step 10:

Display the detected object.

C) System Architecture

Read the reference image containing the object of interest and target image containing a cluttered scene. After reading reference and target image perform feature detection process on both images. Feature detection is the process where we automatically examine an image to

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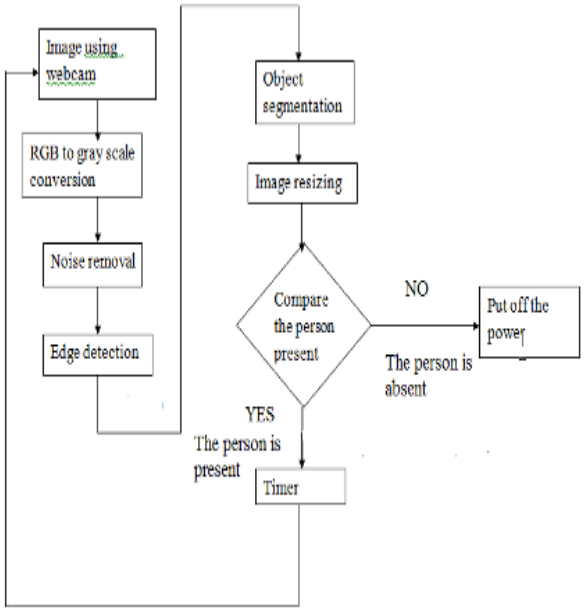
extract features, which are unique to the objects in the image, in such a manner that we are able to detect an object based on its features in different images.



D) Algorithm Implementation

Read the reference image containing the object of interest and target image containing a cluttered scene. After reading reference and target image perform feature detection process on both images. Feature detection is the process where we automatically examine an image to extract features, which are unique to the objects in the image, in such a manner that we are able to detect an object based on its features in different images. The processes of feature detection can be divided in to 3 steps.

1. Detection
2. Description
3. Matching

Input image, determine which objects it contains, and possibly a transformation of the object, based on predetermined interest points. In this paper, we are use SURF algorithm to detect features because of it should provide better results, faster than SIFT algorithm. SURF uses a

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hessian based blob detector to find interest points. The determinant of a hessian matrix expresses the extent of the response and is an expression of the local change around the area.

$$H(X,\sigma) = \begin{bmatrix} L_{xx}(X,\sigma) & L_{xy}(X,\sigma) \\ L_{xy}(X,\sigma) & L_{yy}(X,\sigma) \end{bmatrix} \quad (1)$$

Where

$$L_{xx}(X,\sigma) = I(X) * \frac{\partial^2}{\partial x^2} g(\sigma) \quad (2)$$

$$L_{xy}(X,\sigma) = I(X) * \frac{\partial^2}{\partial xy} g(\sigma) \quad (3)$$

Lxx(X, σ) in equation (2) is the convolution of the image with the second derivative of the Gaussian. The heart of the SURF detection is non-maximal-suppression of the determinants of the hessian matrices. The convolution is very costly to calculate and it is approximated and speeded-up with the use of integral images and approximated kernels. To detect features across scale we have to examine several octaves and levels, where SIFT scales the image down for each octave and use progressively larger Gaussian kernels, the integral images allows the SURF algorithm to calculate the responses with arbitrary large kernels. The purpose of a descriptor is to provide a unique and robust description of a feature; a descriptor can be generated based on the area surrounding an interest point. The SURF descriptor is based on Haar wavelet responses and can be calculated efficiently with integral images.

4.CONCLUSION

The proposed algorithm is for detecting a specific object based on finding point correspondences between the reference and the target image. It can detect objects despite a scale change or in-plane rotation. It is also robust to small amount of out-of-plane rotation and occlusion. This method of object detection works best for objects that exhibit non-repeating texture patterns, which give rise to unique feature matches. This technique is not likely to work

well for uniformly-colored objects, or for objects containing repeating patterns. The major advantage of the system is its Detects presence of human inside room and high efficiency. This basic idea of detecting a single object is extended to multiple object detection and moving object can also be detected the background is subtraction. SIFT uses another scheme for descriptors based on the Hough transforms. Common to both schemes is the need to determine the orientation. By determining a unique orientation for an interest point, it is possible to achieve rotational invariance. Before the descriptor is calculated the interest area surrounding the interest point are rotated to its direction.

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