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REAL TIME SECURITY AND SURVILLANCE SYSTEM

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ABSTRACT:

The security is very important now days. It's very important to detect, recognize or track the unknown face, objects for security purpose. For that Real Time Face detection and tracking and recognition is used and that is built in this system. For a face detection and tracking Raspberry Pi is used to process and extract information from images or videos without need of other processing unit. This system we proposed an image capturing technique on Raspberry Pi board without external processing unit. For Face detection Ad boost algorithm is and for abstract the face from the image or video Haar-Like features box is used. This system we presents a fast and better robust face detection and face tracking method from the video or image. In these systems in which motion region which contains faces and backgrounds in it the face is obtained based on motion detection, except the background. For the Face detection and tracking Ad boost algorithm is used and the face is extracted from the video or the image. For program Open CV is used to detect the face of the people from Open CV the system detect the other objects also by training it.

KEYWORDS: Adaboost algorithm, Harr like features, Open CV.

INTRODUCTION:

Security is very important issue now days. For security purpose there are many systems which is going to be used, but they required more money and time and it is very complex. The Face detection, tracking and Recognition is one of the most active research in human-computer interaction, now days they are widely used for security purpose. In the traditional days the personal identifiedwas depend on external things like passwords, keys etc. But now days this things may be lost or forgotten. From the biometric system the identification is also possible. Each person has different biometric specification. The biometrics identification system has gained attention from the whole world. Each person has different biometric specification hence from that we identify the person from palm, fingerprint, vein pattern, Iris etc.By compared with biometric methods, the face recognition and detection system has more advantages like no physical contact, so face identification system is non-invasiveness.

In image or given video the computation of identification of face location and its size means its face detection is affect the face recognition system. Geometric characteristics method is used to face detection. And it is based on skin colour model and the method based on the statistical theory [3].

In the Real time security and surveillance application the fixed camera is used, the Adaboost method with motion information is used to rapid face detection method from the video. In the face detection method first background difference method is used to remove the unwanted background and detect the face from the video or the motion region. Then the face is detected in motion region using Adaboost algorithm .

The most of the face detection systems are depends on PC. The movability of PC is limited because of it is very heavy, and its size and it required the high power consumption. Hence recognition system using PC is limited in many fields, and it is not appropriate to use. Because of PC disadvantages the Raspberry Pi is very continent or usefull.

The face detection and tracking system using Raspberry Pi platform detects the images or face and stores them into the real time database. These devices have many applications including surveillance, motion analysis, human and animal detection and facial identification.

In this system we analysed the design method of the face detection and tracking algorithm, on the Raspberry Pi board module and its peripherals, implementing based on this platform. Geometric characteristics. In raspberry Pi 2 B model SD card is used for booting and persistent storage. The Foundation provides Debian and Arch Linux ARM distributions for download. The C, java and Linux language are used to

write program in the Python .In this paper we develop the simple security and surveillance system, which is cheaper and easy to use.

RELATED WORK:

There are many ways through which face can be detected but among those feature based approach is mostly used like skin colour and hybrid approach.[5]. Basically, most researcher uses skin colour and classifier-based approach and mostly focus is on detection accuracy and not on speed of detection. For example, Rowley et al, has presented work in which it takes almost 383s on a 200Mhz R4400SGI Indigo 2 to detect a 320 x 240 size image.

In the paper [4] face recognition method based on information theory and coding and decoding of the face image is proposed. Proposed methodology contains two stages first stage include face detection using Haar Based Cascade classifier and second stage is recognition using Principle Component analysis. Paper [13] proposes various other methods for face detection and recognition and it also states that image detection and recognition is the initial step for video surveillance. Paper [12] proposes face recognition method using principal component analysis using 4 distance classifiers. Different distance measure is better for image than the system with only one distance measure. A structural face construction and detection system is proposed in [Sankara Kumar et al, 2013]. Experimental results shows that PCA with Euclidian distance classifier and the squared Euclidian distance classifier has better result than the city block distance classifier.

In this system for face detection and tracking the pipelined technique are used to accelerate the computational time The technique uses Local Binary Pattern (LBP) algorithm and harr like feature available in the OpenCV library, which achieved 16.7 Quarter VGA (QVGA) frames per second.

FACE DETECTION USIN ADABOOST CASCADE CLASSIFIER:

Adaboost algorithm first proposed by Freund and Schapire in 1995, the Adaboost is the most famous machine learning method now. Adaboost algorithm is a frequentative learning method, from the each training session we classify whether the each sample is accurate and in the last time the accuracy rate of the overall classification is determine the weight of each sample. It integrates the weak classifier set at each training session.

A. HAAR-LIKE FEATURES AS BOX CLASSIFIER:

For the face detection and tracking the Adboost algorithm is used, large number of features is are extracted from human face in this system. Haar features algorithm is proposed by Viola Jones's in 2001, the Haar feature is effectively show the difference between face and non-face. The box classifier is represented by Haar feature which is used to extract face features by using integral image.

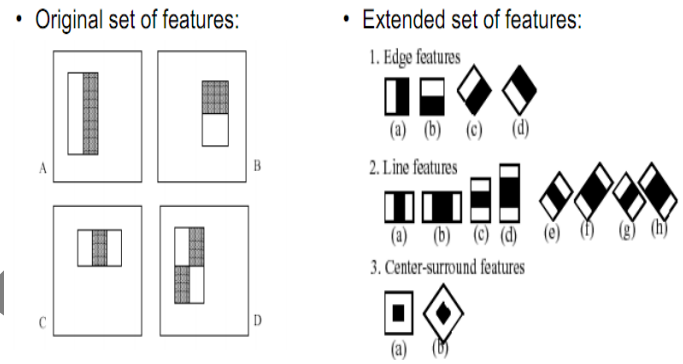

Figure 1: Viola Jones's Haar-like feature

In this system, we learn face detection in Real time video sequences, for that we need to follow speed requirement strictly and video sequences related to frontal face detection Harr like feature quickly compute by the integral image algorithm. The integral image I at the point of (x, y)[1]

$$ii(x,y) = \sum_{x'<x,y'<y} i(x',y') \qquad (1)$$

i(x', y') is the original image of point (x', y'), this is color value of point(x', y'), the color image is converted into the gray image and its value is in between 0 ~ 255. The grayscale image is used to reduce the calculation.

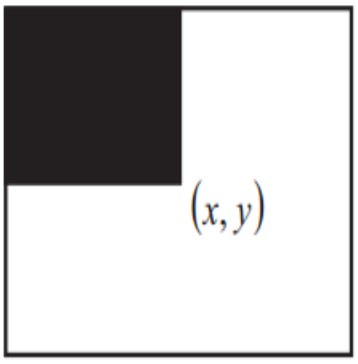

Figure 2: integral image (x, y)

In this algorithm an iterative process are used to quickly calculate the integral image value at corresponding points of image.

$$ii(x, y) = ii(x - 1, y) + s(x, y) \quad (2)$$

$$s(x, y) = s(x - 1, y) + i(x, y) \quad (3)$$

Where $s(x, y) = \sum_{y' \leq y} i(x, y')$ it is the sum of all gray value of all pixels is the sum of gray values which are in the column coordinate of point (x, y)but does not exceed the point.

FACE DETECTION FLOWCHART:

A. TRAINING:

Training in AdaBoost algorithm for image is very important, training requires positive as well as negative samples which contains face and non-face data. In this experiment we use standard 200 positive and 200 negative sample images for training.

Images are considered as Positive images if it contains the objects like face, eye etc. whereas images which do not contains this objects are termed as negative images. For accurate result database must contain both positive and negative images.

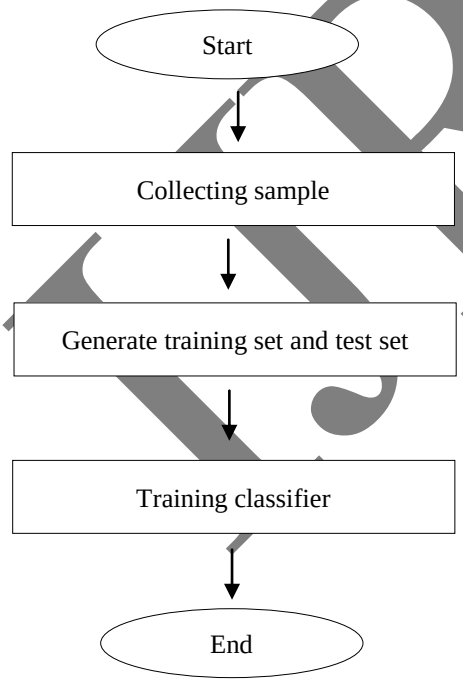

Figure 3: Flow chart of Training

B. DETECTION:

For tracing and detection of face first step is to take video input. Second step contains the pre-processing of the video input which contains the reducing noise from the image and image enhancement. After pre-processing the background of the image is subtracted to extract human face. After human face extraction majority of non-face window are blanked, due to this workload for further process is greatly reduced. Finally Multi-layer classifier which represent features of Haar features is used to extract the exact human face position, then this image is stored.

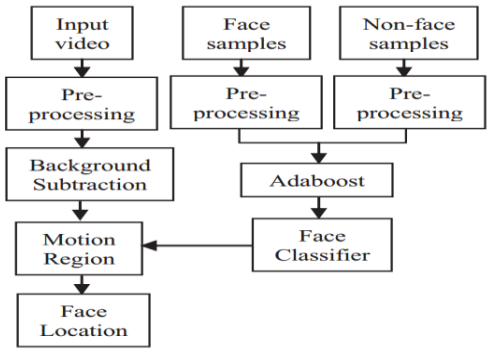

figure4: Flow chart of Face detection

RESULT:

Now days for the security and surveillance face detection and recognition the PC is used, but portability of the PC is limited PC is limited by its weight, size and the high power consumption. Hence using embedded system we get rid of PC means we used Raspberry Pi board module to capture the faces and track the faces for security and surveillance purpose.

For Face detection standard test image like Lena is used. In this paper accuracy rate and time required are tested. There are different parameters including size, co-efficiency of proportional action in searching of window is tested. From the standard image we develop the required changes in the face detection.

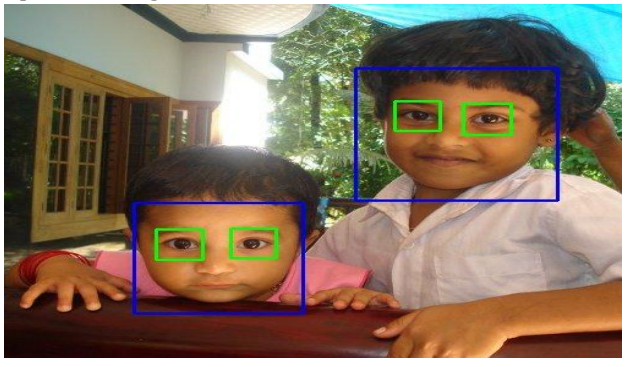

Figure 5: Output

From the Harr cascade feature we detect single or multi face as we trained or it come in to the 320x240 correct detection of face is 92%. This technique is used for security purpose.

CONCLUSION:

In this system Harr like feature are used to detect the Face. Based on this algorithm we design prototype of Real Time face detection and tracking with Raspberry Pi module.

This Raspberry Pi module is small, lighter and it has lower power consumption than PC, hence it is more continent than PC based face detection. This system shows that it is effective method of Face detection and tracking system using Raspberry Pi module.

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