Real Time Face Security using Live Webcam

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Abstract- People detection and tracking for restricted or high-security areas is one of the important research fields that have gained a lot of attention in the last few years. Although person detection and counting systems are commercially available today, there is a need for further research to address the challenges of real world scenarios. There is lot of surveillance cameras installed around us but there are no means to monitor all of them continuously. It is important to build up a PC vision based advances that consequently procedure those pictures so as to identify tricky circumstances or unordinary conduct. Mechanized video reconnaissance framework tends to ongoing perception of individuals inside a bustling domain prompting the depiction of their activities and connections. It requires identification and following of individuals to guarantee security, wellbeing and site the board. Item recognition is one of the basic strides in computerized video reconnaissance.

Keywords– surveillance system, Face Detection, viola-jones

I. INTRODUCTION

1.1 Face detection

Face detection is a challenging task because variations in scale, location, orientation, pose, facial expression, occlusion, and lighting conditions change the overall appearance of faces. Various approaches for face detection have been proposed which include, knowledge-based, and appearance-based methods, and through template matching, skin colour, motion, etc., to mention a few.

1.2 Knowledge-based methods

In this approach, rules are derived from the researcher's prior knowledge that a face often appears in an image with two eyes that are symmetric to each other, a nose, and a mouth [YH94]. At the highest level, all possible face candidates are detected by scanning a window over the input image and by applying a set of rules at each location. The rules at the higher level are general descriptions of what a face looks like while the rules at lower levels rely on details of facial features. A multi-resolution hierarchy of images is created by averaging and sub-sampling. The lowest resolution image is searched for candidates and these are fiirther processed at finer resolutions. Surviving candidate regions are then examined with another set of rules that respond to facial features such as eyes and mouth.

In contrast to such a knowledge-based top-down approach, nimierous bottom-up featurebased methods have been proposed to first detect facial features and then to infer the presence of a face. Facial features such as eyebrows, eyes, nose mouth and hair-line are commonly extracted using edge detectors. Sirohey has proposed a localization method to segment a face from cluttered backgroimd for face identification. An edge map in combination with heuristics is used to remove and group edges so that only the ones on the face contour are preserved. An ellipse is then fit to the boundary between the head region and the background.

1.3 Appearance based methods

Appearance based methods rely on statistical analysis and machine learning to find the relevant characteristics of face and non-face images. The characteristics learnt are in the form of distribution models or discriminant fimctions that are subsequently used for face detection.

Principal component analysis is a standard technique used to approximate the original data with a lower dimensional feature vector. The basic approach is to compute the eigen vectors of the covariance matrix, and approximate the original data by a linear combination of the leading eigenvectors. The mean squared error in reconstruction is equal to the sum of the remaining eigenvalues. Principal component analysis on a training set of face images is performed to generate the eigenfaces which span a subspace called the face space. Images of the faces are projected onto the subspace and clustered.

Similarly non-face images are projected onto the same subspace and clustered. Face images do not change radically when projected onto the face space, while projection of non-face images appears quite different. To detect faces, each input image is scanned with a rectangular window and the distance measure between an image region within the window and the face space is computed for all locations in the image. The distance from face space is used as a measure offaceness and these distances from the face space is the face map. A face can be detected from the local minima of the face map. called the face space. Images of the faces are projected onto the subspace and clustered. Similarly non-face images are projected onto the same subspace and clustered. Face images do not change radically when projected onto the face space, while projection of non-face images appears quite different. To detect faces, each input image is scanned with a rectangular window and the distance measure between an image region within thewindow and the face space is computed for all locations in the image. The distance from face space is used as a measure offaceness and these distances from the face space is the face map. A face can be detected from the local minima of the face map.

1.4 Template matching methods

In template matching a standard face pattern usually frontal is prepared manually or by taking the average of several normalized face images. Given an input image, the correlation values with the standard template are computed with a moving window over the given image. The existence of a face is determined based on the correlation values. This approach has the advantage of being simple to implement. However, it may be inadequate for face detection with variations in scale, pose and shape. Multiresolution, multi-scale, sub-templates, and deforaiable templates have subsequently been proposed to achieve scale and shape invariance. Silhouettes have also been used as templates for face localization . A set of basic silhouettes is obtained using principal component analysis on face examples in which the silhouettes is represented by an array of bits. These eigen-silhouettes are then used with a generalized Hough transform for localization. Face detection method based on generic active contours called snakes and templates is proposed by Kwon and Vitoria Lobo in

Deformable templates are used by Yuille, P. Hallinan, and D. Cohen In this approach, facial features are defined to link edges, peaks and valleys in the input image to the corresponding parameters in the template. The best fit of the elastic model is found by minimizing the energy function of the parameters. The drawback of this approach is that the deformable template must be initialized in the proximity of the object of interest.

Face detection using snakes and template is also proposed by Kass, A. Witkin, and D. Terzopoulos . An n-pixel snake is used to find and eliminate small curve segments. Each face is approximated by an ellipse and a Hough transform is used to find a dominant ellipse. A set of four parameters describing the ellipses are obtained and used as candidates for face locations.

A flexible appearance model based method for automatic face recognition is presented by A. Lanitis, C.J. Taylor, and T.F. Cootes [LTC95]. To identify a face, both shape and grey-level information are modelled and used. Active shape models (ASM) are statistical models of the shapes of objects which iteratively deform to fit to an example of the object in a new image. The statistical shape model is trained on example images using principal component analysis, where the variables are the coordinates of the shape model points.

1.5 Motion detection approach

If a face is to be detected in a video sequence, motion information is a convenient means of locating moving objects. A straightforward way to achieve motion segmentation is by frame difference analysis. This approach is simple and is also able to distinguish a moving foreground effectively regardless of the background content. Compared to frame difference, results generated form moving contours are always more reliable, when motion is insignificant. Face images are manually cropped from each frame of the video with pose variations and a recognition algorithm for large pose variations is presented.

1.6 Face recognition approaches

Many methods for face recognition have been proposed over the last two decades. Mixture of techniques used makes it difficult to classify these systems purely based on the type of techniques they use for feature representation or classification. However based on the psychological study of how humans use holistic and local features these approaches may be broadly categorized as holistic matching methods, feature-based methods, hybrid methods and neural network based methods.

1.7 Holistic approaches

These methods use the whole face region as the raw input to a recognition system. These methods can be regarded as picture recognition. An image is considered as a hidimensional vector, i.e., a point in a high-dimensional vector space. Appearance-based or view based approaches use statistical techniques to analyze the distribution of the image vectors in the vector space, and derive an efficient and effective representation in the feature space. Given a test image, the similarity between the stored prototypes and the test view is then carried out in the feature space. Recognition using image Correlation Perhaps, the simplest classification scheme is the nearest neighbour classifier in the image space .

II. LITERATURE REVIEW

Raghavendra et al. have depicted the Reliable client recognizable proof which was a typical necessity for pretty much every protected framework. Biometric offer a characteristic and dependable answer for specific parts of personality the executives by perceiving the people dependent on their innate physical and conduct attributes. Multimodal biometric individual check was increasing much ubiquity as of late as they beat unimodal individual confirmation. Their paper displays an individual check framework utilizing discourse and face information. The confirmation framework involves two classifiers whose scores were melded utilizing aggregate principle after standardization. The tests were done on VidTIMIT database. The exploratory outcomes demonstrate that face master structured utilizing Two-Dimensional Linear Discriminate Analysis and discourse master utilizing Linear Prediction Cepstral Coefficients as highlight extractor and Gaussian Mixture Model as feeling generator with 16 blends will give a Half Total Error Rate of 1.2%.

Uma Maheswari and Anbalagan have portrayed an astute multimodal biometric check framework for physical access control, in view of combination of iris, face and unique finger impression designs. Highlight vectors were made autonomously for inquiry pictures and are then contrasted and the selected layouts of each biometric quality to register the coordinating score. A ultimate conclusion was made by combination at their coordinating score level. Their proposed framework was intended to suit inserted answers for high security access in inescapable conditions utilizing biometric highlights.

Rufeng Chu et al. have displayed a face and palmprint multimodal biometric distinguishing proof technique and framework to improve the ID execution. Powerful classifiers dependent on ordinal highlights were built for appearances and palmprints, respectively.[3] Then, the coordinating scores from the two classifiers were consolidated utilizing a few combination systems. Exploratory outcomes on a center scale informational collection have shown the viability of their proposed framework.

III. ISSUE FIND

Because of late psychological militant assaults, governments all around the globe are searching for approaches to fix the security of their fringes. They are trying different things with new innovation answers for guarantee solid national security, and one of these advancements is biometric facial acknowledgment. This amazing, adaptable continuous programmed human following framework for human limited zone has a solid shot of turning into the future default security stage for fringe control the whole way across the world.

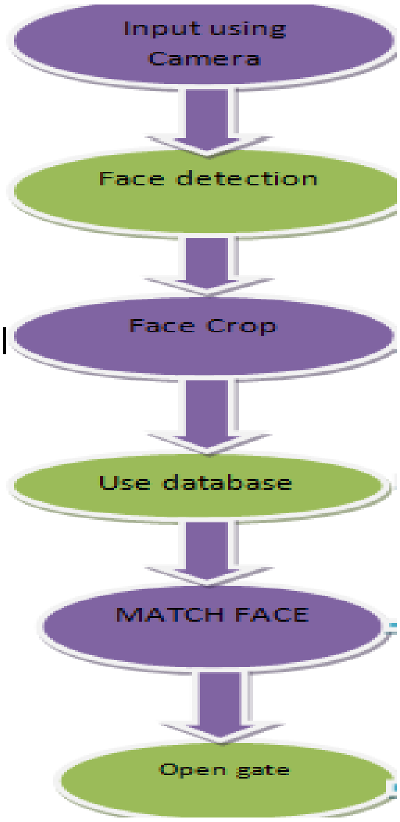
IV. LATEST TECH. FOR FACE DETECTION

Viola-Jones has a great detection rate in every scenario and is better than the Kanade-Lucas-Tomasi in every scenario. The Viola-Jones face detector Here we discuss about the concern of implementation of the Viola-Jones face detection algorithm. The first part elaborates on the methods and theory behind the algorithm. In order to avoid copying the original Viola-Jones paper this section is kept relatively short, but still the most important points are explained. Secondly interesting aspects of the actual implementation are emphasized and presented together with results and comments on performance. This structure is preferred since many intermediate results have affected implementation decisions and vice versa. The basic principle of the Viola-Jones algorithm is to scan a sub-window capable of detecting faces across a given input image. The standard image processing approach would be to rescale the input image to different sizes and then run the fixed size detector through these images. This approach turns out to be rather time consuming due to the calculation of the different size images. [5]Contrary to the standard approach Viola-Jones rescale the detector instead of the input image and run the detector many times through the image – each time with a different size. At first one might suspect both approaches to be equally time consuming, but Viola-Jones have The scale invariant detector The first step of the Viola-Jones face detection algorithm is to turn the input image into an integral image. This is done by making each pixel equal to the entire sum of all pixels above and to the left of the concerned pixel.[6]

The cascaded classifier The basic principle of the Viola-Jones face detection algorithm is to scan the detector many times through the same image – each time with a new size. Even if an image should contain one or more faces it is obvious that an excessive large amount of the evaluated sub-windows would still be negatives (non-faces). This realization leads to a different formulation of the problem: Instead of finding faces, the algorithm should discard non-faces. The thought behind this statement is that it is faster to discard a non-face than to find a face. [7]With this in mind a detector consisting of only one (strong) classifier suddenly seems inefficient since the evaluation time is constant no matter the input. Hence the need for a cascaded classifier arises. The cascaded classifier is composed of stages each containing a strong classifier. The job of each stage is to determine whether a given sub-window is definitely not a face or maybe a face. When a sub-window is classified to be a non-face by a given stage it is immediately discarded.

V. PROPOSED METHODOLOGY

5.1 FLOW STEP



Viola jones face detection algorithm

By and large, viola jones confront identification calculation has three basic strides, including highlight extraction, boosting and multi-scale discovery.

*Read a video frame and run the face detector.Camera continuous checking and outputting image if a human face is not found in the video frame input.

***Feature Extraction and Face Recognition**

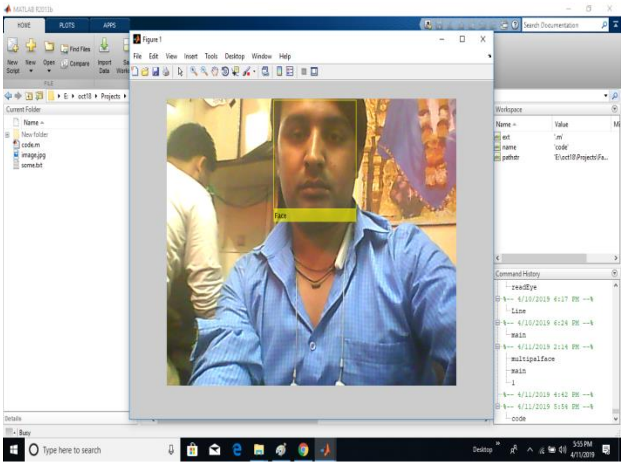
Face detection takes camera/video sequences as input and locates face areas within these images. This is done by separating face areas from non-face background regions. Facial feature extraction locates important feature (eyes, mouth, nose and eye-brows) positions within a detected Face.

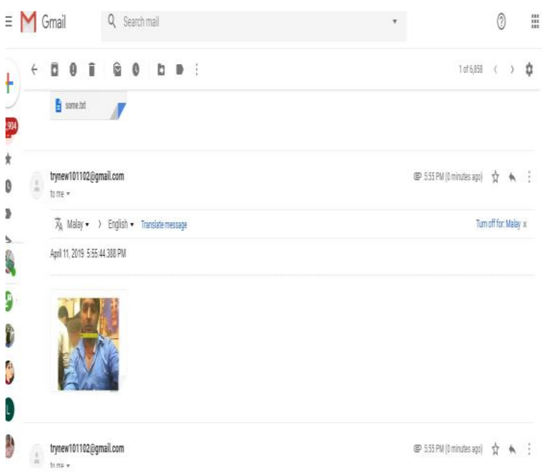
*Real time input is taken in the video format. The video is first converted into frames and then further processed. Each cropped facial image was down sampled to 20 × 20

*After cropping face automatic saved in folder

*automatic attach crop photo in SMTP WEB MAIL

VI. RESULTS





VII. CONCLUSION

Though the problem of face recognition has been studied for past two decades most of the work is carried out on still images. Very few on-line face recognition systems have been developed to investigate the problem of face recognition in real time scenario under predefined constraints. The first step in an automatic face recognition system is to localize the face region in a cluttered background and efficiently segment the face fi"om each fi-ame of a video sequence. Though various techniques for detecting a face have been proposed in the literature they are computationally expensive for real time applications. Automated video surveillance system addresses real-time observation of people within a busy environment leading to the description of their actions and interactions. It requires detection and tracking of people to ensure security, safety and site management. Object detection is one of the fundamental steps in automated video surveillance. Object detection from the video sequence is mainly performed by background subtraction technique. It is widely used approach for detecting moving objects from static cameras. As the name suggests, background subtraction is the process of separating out the foreground objects from the background in a sequence of video frames. The main aim of the surveillance system here is, to detect and track human in by using single camera. Camera is fixed at the required place background subtraction algorithm is used for segmenting moving object in video. If human entity is detected the tracking lines are formed around human and the object is tracked. The system when realizes the human entry, it is processed in a second and the alert by e-mail is produced for the security purpose. The main aim is to develop a real- time security system

VIII. REFERENCE

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