Security Enhancement through Automated Face Detection Using Viola-Jones Algorithm

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ABSTRACT

This is a project to develop an e-mail application using HCI features helping users check their mailbox easier. It is consist of a network module to develop a standalone email application to ask user home security. a face recognition module Face recognition algorithm and pick the fastest one to avoid lag and use it as a security level of application. This paper describes the technique for real time human face detection and tracking using a modified version of the algorithm suggested by Paul viola and Michael Jones. The paper starts with the introduction to human face detection and tracking, followed by apprehension of the Vila Jones algorithm and then discussing about the implementation in real video applications. Viola Jones algorithm was based on object detection by extracting some specific features from the image. We used the same approach for real time human face detection and tracking. Simulation results of this developed algorithm shows the Real time human face detection and tracking supporting up to 50 human faces. This algorithm computes data and produce results in just a mere fraction of seconds.

Keywords: Face recognition; Email; Interactive; Blob detection, Human face detection, Integral Image

I. INTRODUCTION

Face identification has made its presence evident as an impact of advancement in technologies. Face identification in video surveillance has always been a challenging field where it needs to undergo a series of consideration to identify a particular face in the video. In the upcoming paper initially a real time facial detection is performed using an open source environment that runs in processing and later on captured faces are correlated with the template faces that are stored in the database using Matlab. Once the faces are identified then the profile of the person is displayed to notify the behavioral status of the person who is under study. There are certain algorithms for face recognition.

With increasing terrorist activities and augmenting demand for video surveillance, it was the need of an hour to come up with an efficient and fast detection and tracking algorithm. Many real time face tracking systems have been developed [2][3] in the past. In this paper, we proposed a more efficient algorithm that consists of three intermediate steps, first is the development of a new image representation called "*integral image"* [4], which allows feature selection to be easy and rapid. Second step deals with the construction of classifiers that helps us to segregate desired features from the set of large number of features using a technique called *"AdaBoost"* [5] A face acknowledgment framework looks at a couple of facial pictures and chooses if the picture match contains same personality. This correlation depends on facial elements separated from the picture combine. The result of this confirmation procedure is a check choice which is either a match or non-coordinate – coordinate compares to a picture combine containing same character while a non-coordinate choice relates to various personalities. Such a confirmation framework discovers the legitimacy of asserted personality and in this manner has numerous applications in territories like get to control, outskirt security.

Check: Generally depicted as coordinated coordinating framework in light of the fact that the framework tries to coordinate the picture exhibited the person against a particular picture as of now on document. Recognizable proof: It checks the picture introduced against all others as of now in the database. Recognizable proof frameworks are depicted as a 1-to-n coordinating framework, where n is the aggregate number of pictures in the database. There are various application ranges in which confront recognition can be misused for these two purposes, a couple of which are laid out beneath. Security (access control to structures, airplane terminals/seaports, ATM machines and outskirt checkpoints [1]; PC/system security [1]; email confirmation on media workstations)

II. RELATED WORK

Introduction Of Various Techniques

Face recognition is an evolving area, changing and improving constantly. This section gives the overview of various approaches and techniques along with their advantages and disadvantages. Different approaches of face recognition can be categorized in three main groups such as holistic approach, feature-based approach, and hybrid approach [2].

- **Geometry Feature-based Approach**

The geometry feature-based approach methods analyze local features such as nose, eyes and their geometric relationships. Sometimes this approach is known as only feature-based approach.

- **Holistic Approach**

Many researchers followed this approach. In the holistic approach whole face region is taken into account as input data to the system. Various methods comes under this approach are eigenfaces, fisher faces, support vector machine, hidden markov model (HMM). They all are based on principal component analysis (PCA).

- **Hybrid-Approach**

Under the hybrid approach the combination of local feature and whole feature is used. Modular eigenface, hybrid local feature methods are for hybrid approach. Human facial feature plays important in face recognition. Research and studies have determined that eyes, mouth and nose are amongst the most significant feature for recognition . Some image processing techniques extract feature points such as eyes, nose, and mouth and then used as input data toward the application. Various approaches have been proposed to extract these facial points or features from the images. The basic approaches are as follows.

Geometry –based Technique

In this technique feature are extracted using the size and the relative position of important components of images. In this technique under the first method firstly the direction and edges of important component is detected and then building feature vectors from these edges and direction. Canny filter and gradient analysis usually applied in this direction. Second, methods are based on the grayscales difference of unimportant components and important components, by using feature blocks, set of Haar-like feature block in Ad boost method [6] to change the grayscales distribution into the feature.

Figure 1: geometric representation of a person

Template Based Technique

This strategy separates facial component utilizing suitable vitality capacity. Strategies have been proposed by Yuille et al. [7], recognizing and portraying components of confronts utilizing deformable formats. In deformable layouts the component of interest, an eye for instance, is portrayed by a Parameterized format. These parameterized formats empower from the earlier learning about the normal state of the elements to direct the identification procedure [7]. A vitality capacity is characterized to connections tops, edges, and valleys in the picture force with comparing properties of the layout. After that the layout coordinating is finished with the picture, in this manner misshaping itself to locate the best fit. For the descriptor reason last parameter worth is utilized. In the Template based initial an eye layout is utilized to distinguish the eye from picture. At that point a relationship is discovered between the eye layouts with different covering locales of the face picture. Eye area have a greatest connection with the template[8].

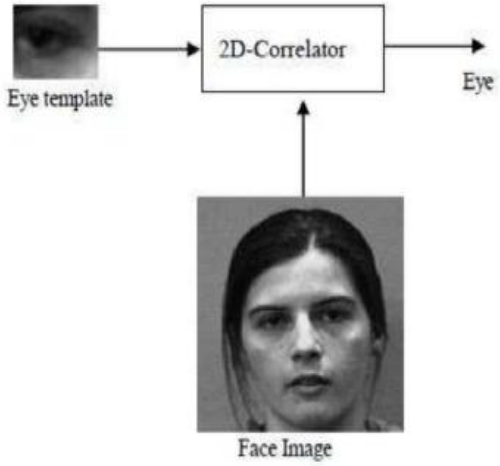

Figure 2: An example of Template based face recognition

III. OBJECTIVES

In research of Face Recognition, there are issues in detection and matching of face with the trained images. Our main goal is to detect the image by different perspectives.

1. To analyze the existing techniques of Face Recognition.
2. To identify the issues in existing system.
3. Research on new parameters for improves the Previous work.
4. Implement Viola-jones to improve the efficiency of face detection.
5. Analyse the improved efficiency.
6. Analyse the results and accuracy.
7. automatic face mailing system.

IV. FLOW CHART WITH DESCRIPTION FLWO CHART

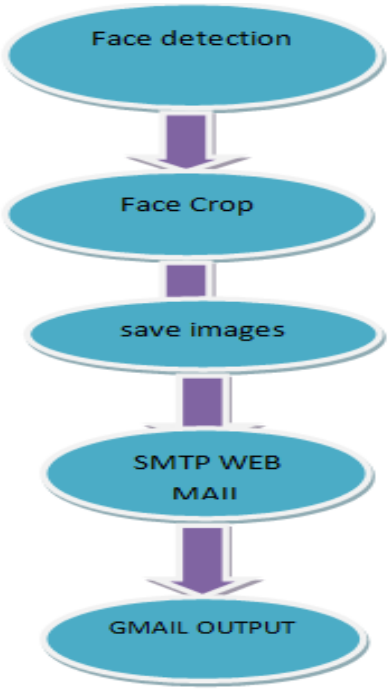

Figure-3 Viola jones face detection algorithm

The Viola–Jones Face location system is the main Face recognition structure to offer focused thing discovery cites continuously proposed in 2001 by means of Paul Viola and Michael Jones. Notwithstanding the way that it could figure out how to go over an implication of thing classes, it transformed into supported in the primary through the issue of face location. The inconvenience to be tackled is identification of appearances in a photo. A human can attempt this without trouble; however a PC wants exact directions and imperatives. To make the

endeavor additional conceivable, Viola–Jones calls for full view frontal upright appearances. In this manner for you to be recognized, the total face needs to indicate the computerized camera and need to not be tilted to both aspect. While it appears those requirements could decrease the arrangement of tenets programming especially, in light of the fact that the location step is most generally joined by an acknowledgment venture, in exercise these cutoff points on posture are pretty suitable. The abilities looked for by means of the recognition system all around includes the wholes of photograph pixels inside square districts. In that capacity, they look somewhat like Haar premise highlights, which have been utilized in the past inside the domain of photo based thoroughly Face detection.[3] in any case, in light of the fact that the capacities utilized by Viola and Jones all rely on upon two or three square region, they might be typically additional confused. The figure at right outlines the four restrictive sorts of abilities utilized as a part of the system. The cost of any given element is always unquestionably the aggregate of the pixels inside clean rectangles subtracted from the whole of the pixels inside shaded rectangles.

By and large, viola jones confront identification calculation has three basic strides, including highlight extraction, boosting and multi-scale discovery Clearly highlight is extremely critical to any Face location calculation. Fundamentally, there are a ton of elements, for example, eyes, nose, the topology of eye and nose, can be utilized for face location. In viola jones confront location, an exceptionally basic and clear component has been utilized. Figure 1 indicates four diverse element in viola jones calculation. Each element can be gotten by subtracting white regions from the dark regions.

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.

Viola-Jones Implementation Of Face Recognition
Viola Jones Implementation of Face Recognition are as below:

The characteristics of Viola–Jones algorithm which make it a good detection algorithm are:

- •Robust – very high detection rate (true-positive rate) & very low false-positive rate always.
- •Real time – For practical applications at least 2 frames per second must be processed.
- •Face detection only (not recognition) - The goal is to distinguish faces from non-faces (detection is the first step in the recognition process).

The algorithm has four stages:

1. Haar Feature Selection
2. Creating an Integral Image
3. Adaboost Training
4. Cascading Classifiers

The features sought by the detection framework universally involve the sums of image pixels within rectangular areas. As such, they bear some resemblance to Haar basis functions, which have been used previously in the realm of image-based object detection. However, since the features used by Viola and Jones all rely on more than one rectangular area, they are generally more complex. The figure on the right illustrates the four different types of features used in the framework. The value of any given feature is the sum of the pixels within clear rectangles subtracted from the sum of the pixels within shaded rectangles. Rectangular features of this sort are primitive when compared to alternatives such as steerable filters. Although they are sensitive to vertical and horizontal features, their feedback is considerably coarser.

Flow chart with description

Input using Camera

- *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.

Face detection

- 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.

Face Crop

- 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 .

Save Images

- After cropping face automatic saved in folder
- SMTP WEB MAIL automatic attach crop photo in SMTP WEB MAIL

Gmail Output

- automatic images send in Gmail

V. PROPOSED METHOD

an ongoing face acknowledgment framework. The primary test for a constant face acknowledgment and Tracking framework is of powerful element extraction. The proposed framework uses the Eigen confront strategy is data decrease for the continuous application. There is a mind boggling measure of data present even in a little face picture. The calculation which is utilized for the recognition of individual face is vailo-jones calculation. The landing and takeoff time of the particular people are put away in the particular picture on the left side and right side corner of the pictures. By this procedure the hard product necessity of the framework diminishes enormously. A strategy must have the capacity to separate pictures in order to successfully speak to face pictures instead of pictures by and large. We attempting to discovery and acknowledgment confront progressively and mailing framework we propose some progression beneath. At whatever point the client not in the house then the picture is caught naturally and underwear the client with the web mail benefit .Web cam recognize if any individual is coming in the premises. The caught picture is broke down for the face recognition, at whatever point the individual face is perceived then instantly a web mail alarm is send to the client with the end goal that client has an unmistakable recognizable proof on when the individual is coming and so on. The picture is put away in the Google drive which enables the client to get to the picture any place he needs to. Before the finish of the he is just having just couple of pictures which helps him to perceive the interlopers and guests and so on. Web mail ready helps the client to focus when just the individual touched base into the reconnaissance and it ignores the rest of the cases and stores the pictures in the move down with the end goal that client can know when to focus and when he don't need to. The calculation which is utilized for the recognition of individual face is vailo-jones calculation.

VI. CONCLUSION AND FUTURE WORK

This paper introduces a novel face location strategy which lessens the false negatives, and the false positives rates of the outstanding technique Viola and Jones confront locator. Confront discovery takes camera/video successions as information and finds confront zones inside these pictures. This is finished by isolating face zones from non-confront foundation districts. Facial element extraction finds imperative component positions inside a recognized Face Real time info is taken in the video organize. The video is first changed over into edges and after that additionally prepared. Each trimmed facial picture was down examined to 20 × 20. In the wake of trimming face programmed spared in envelope after that face picture programmed connect in webmail server and it will mail on Gmail. Home security utilizing face recognition has turned into the prime worry for everybody in present situation. In this work an endeavor has been made to build up a home security framework which is available, reasonable but powerful. The proposed framework depends on 'face discovery Control System' (which deals with the web stage for validation and observing. This framework is along these lines practical as it depends on existing system foundation.[9]

The framework here makes utilization of foundation subtraction in haar confront indicator. Foundation subtraction requires more calculation time influencing the general framework execution. The benefit of utilizing this stage is lessened locale of intrigue. In later stage face is identified just in the area gave by this stage. Face is critical biometric highlight of human life systems and has numerous impossible to miss highlights. Prominently utilized haar identifier is utilized for distinguishing faces in recordings.[10]

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