

SMART DOOR LOCK CONTROL SYSTEM USING FACE RECOGNITION AND DETECTION THROUGH VIOLA JONES ALGORITHM BY NEURAL NETWORKS IN MATLAB

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Abstract— The security for the door lock control has been the most essential necessity of all the homes, business administrations. when a person comes to unlock the door, the web cam recognizes the registered face and the motor connected to the Arduino uno R3 unlocks the door. If any peculiar faces (or) unknown person comes to unlock the door, it captures the face and stores it in the memory. Factually, face detection is the most important step in an automated system which could include another kind of face processing. The neural networks are initially created as well as trained with the set of training faces and non-faces.

Index Terms— Face recognition, Face detection, Viola jones algorithm, HARR transform.

I. INTRODUCTION

Face recognition is one of the most sophisticated technologies studied in biometrics and it has a wide range of applications in real time. But face detection is perhaps the complicated step that is faced in Image processing. Face identification is the task of identifying an already detected objects probably as a known or unknown face.

A. Face recognition: -

Face recognition is a technology where there exists the possibility of identifying the face of an authorized one compared to the image extracted from a digital image from a video source. There are lot of methods where facial recognition works, but practically, they work on comparison with the selected features of the face from the given image within the database. It can also be considered as an application based Biometric Artificial Intelligence that will identify the persons based on the facial alignment, facial textures and shapes by analyzing the patterns.

B. Creating a Data Base:

Generally, a Data base is created extracting images from a sample video. With the input images extracted from a kind of video that the authorized person is present then we are going to create a database. In order to match the images in the

database with the image in the web cam, the image that is taken from a video or not particularly an image is going to be extremely clear enough pixel image. The number of authorized persons that are represented in the database will depend on the working of the algorithm and the complexity that exists in working out the procedure of the flow chart. In general, two to three authorized faces can be stored in the database for the accurate functioning of the algorithm.

C. Viola jones algorithm: -

Viola-Jones algorithm is specifically designed for detecting the faces in the front ways in a better way than detecting the face sideways, upwards or downwards. The image is made a grayscale conversion and the coordinates are specified initially and is later compared to the alignments in the digital image.

Our project of real time face identification through camera and video analysis involves two major operations namely,

Face Detection

Face Identification

Face Detection is achieved from Viola-Jones algorithm which is considered as one of the best feature-based algorithms with highest accuracy and taking less time.

D. HAAR features:

HAAR-like features are named after a Hungarian mathematician, Alfred HAAR. The HAAR wavelets detects the rectangular boxes which will contain the brighter and darker edges in the portion of the face which will have common features in all the faces where one side will be brighter and other side will be darker like an edge of an eyebrow. Sometimes, the side portions will be darker and the middle portion will be brighter than the side portions as shown in the figure 1.2. There are 3 types of HAAR-like features that Viola and Jones recognized in their research:

Edge features

Line-features

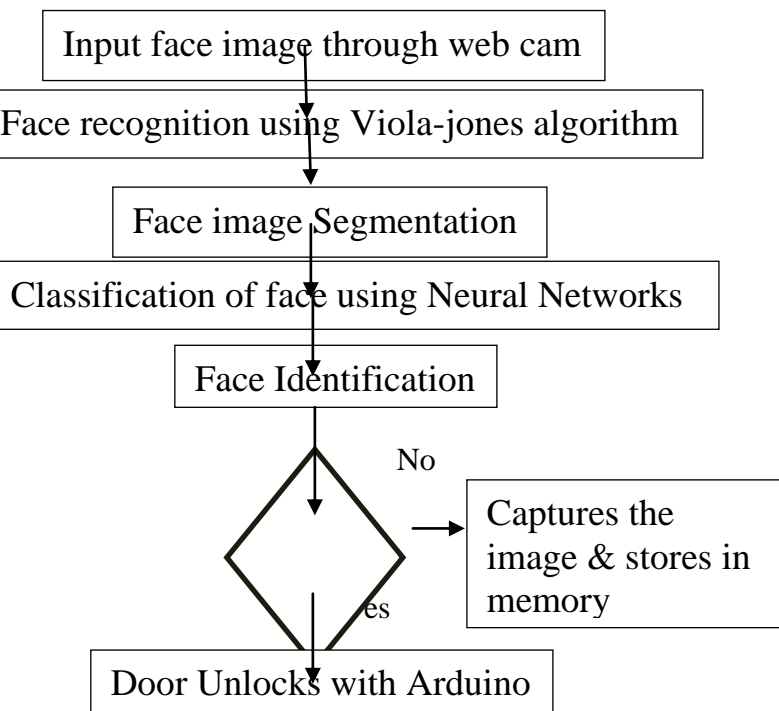
Four-sided features



Figure 1.1: Figure showing the representation of HARR features in Viola-jones algorithm

The representation of Edge features and line features of HARR transform in the application of Viola-jones algorithm is shown in the figure above which contains both shaded and light portions on the either sides or in between the opposite portions.

II. FLOW CHART: -



III. EXISTING AND PROPOSED WORKS:

A. 3a. Features of the project existing:

Segmentation of the face image.

As the algorithm assigns into perfect alignment, the complexity level increases.

The algorithm will recognize the faces that are matched in the database and does not alert if it recognizes any peculiar faces.

Face recognition is not done using Viola-jones algorithm and Neural networks together previously.

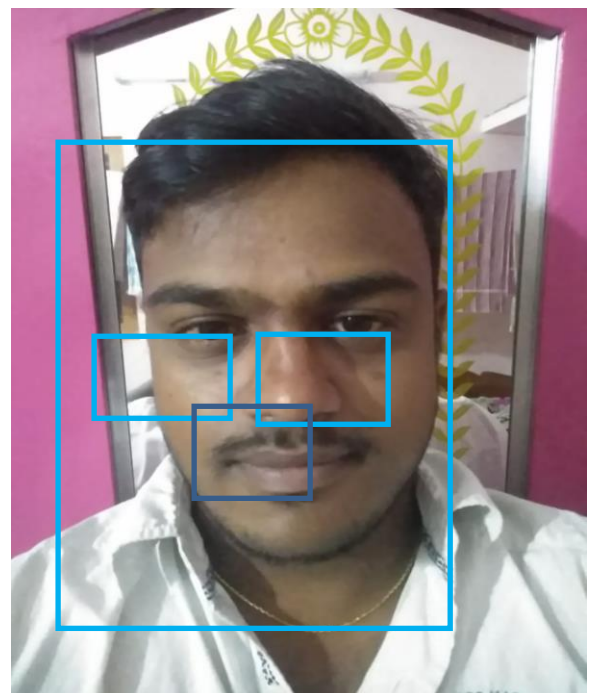


Figure 3.1: Figure showing the segmentation of the face image

B. Features of the project proposed:

It is the object detection frame work which will involve sums of the image pixels within rectangular areas (HARR features).

Face Detection is achieved by Viola-Jones with highest accuracy and taking less time.

The algorithm will recognize the faces that are matched in the database and alerts if it recognizes any peculiar faces.

The neural network is initially created as well as trained with a training set of faces and non-faces which will be functioned with the viola-jones algorithm.

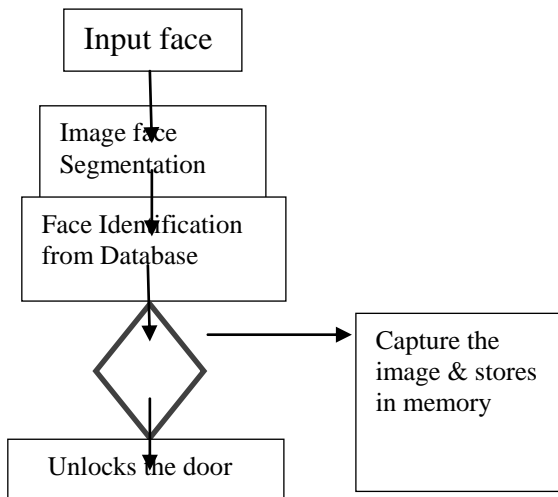


Figure 3.1 Output block Diagram

IV. EXPERIMENTAL RESULT: -

Face Detection is achieved by Viola-Jones Algorithm which is considered as one of the best feature-based algorithms with highest accuracy and taking less time.



Figure 4.1: Figure showing the unlocking of door using Arduino.

Consider an image from the Bio ID-Face-Database as shown in Figure, it is preprocessed for identification. Applying the Viola-Jones algorithm to the image in the figure, identified face image shown in Figure is obtained (bounding box on identified face). It is then resized to 100x100 pixels that is the HAAR features are calculated and all the related features are extracted.

V. CONCLUSION

The paper had presented a real time face recognition technique that utilizes features derived from the coefficients of discrete cosine transform (DCT), along with the SOM-based classifier. The complete system is assessed in the MATLAB using a database images of 25 face images, having 5 subjects and in each subject, it is having five images with different kind of facial expressions. Training for almost 850 epochs it has achieved a recognition rate of about 81.36% for 10 consecutive trials. A decremented space for features, explained for the experiment above decreases computational requirements as compared to standard DCT feature extraction methods. This makes the system better suited for low-cost, real-time hardware implementation. Commercial implementation of these techniques does not exist currently. However, it is predictable that a SOM-based face recognition system might be possible in the future practically.

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