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Fraud Detection in Examination using LBP method

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Abstract: Impersonation of the candidate is a fundamental problem in examination system often referred as malpractice. Hall ticket and identity cards are normally used in the examination system for fraud detection. The problem of fraud detection in hall ticket is of great interest in document analysis domain. Document image analysis is a major research area in pattern recognition systems for identification and classification of image objects within a document. Existing examination system mainly deals with document image analysis techniques and biometric system in identification, recognition and classification of the candidate. The proposed model focuses on the image/video for analysis. In this paper an attempt is made to develop automated face detection and recognition for detecting impersonation of candidate in examination system. Automated face detection and recognition can further be used in identity verification and attendance monitoring in examination system. The proposed work comprises of two steps: enrollment and authentication. The enrollment process is divided into two stages online registration and face detection. In authentication image analysis process is carried out with the help of local binary patterns which is used to convert an image into array for further processing.
Keywords: Pre-processing, segmentation, Fraud detection, document image analysis

1. Introduction

The major problem that occurs in examination system is malpractices. Malpractice is identified due to the absence of credible identity verification system for offline and also for online examinations. In order to overcome the above problem researchers have focused on the use of artificial techniques and use of biometrics. In the past history work has been carried out on examination malpractices. ANN classifiers are used for similarity measure between trained and test features [1]. Monitoring can be done using authentication techniques. An iris recognition method based on the natural open eyes. In order to realize exactly matching, it must eliminate these factors through the image pre-processing. Iris image pre-processing includes iris location, eyelid fitting, eyelash detection and normalization [4]. Image quality assessment for live nests detection technique is used to detect the fake biometrics. A biometric system should have the uniqueness, stability, collectability, performance, acceptability and for resistance. Image quality measurements for out real and fake user [6]. Multi model biometric is also done in which more than one biometric grouped together & compare with the existing databases. Multi model biometric system uses the face recognition approach for the automatic attendance of students in the classroom environment [2]. Face recognition is an integral part of biometrics. In biometrics basic traits of human is matched to the existing data and depending on result of matching identification of a human being is traced [9]. Facial features are extracted and implemented through algorithms which are efficient and some modifications are done to improve the existing algorithm models.

Generally frauds are detected by using outlier analysis [8]. Since 2002, face detection can be performed fairly reliably such as with open CV's face detector working roughly 90-95% of clear photos of a person looking forward at the camera. Face recognition has long been goal of computer vision but only in recent years reliable automated face recognition has become a realistic target of biometrics research. In the context document image retrieval, hall tickets provide an important form of indexing that enables effective exploration of data. Given a large collection of hall tickets, detecting for fraud hall ticket is a highly effective way of retrieving documents. The problem of face recognition can be stated as identifying an individual from images of the face and encompasses a number of variations other than the most familiar application of mug shot identification. The main focus of these is to detect fraud in the examination system by taking input as video. The goal of this effort is to develop new algorithm for a robust pose-invariant face recognition that overcome many of the limitation found in existing facial recognition system. Researcher is interested in addressing the problem of detecting faces in colour images in the presence of various lighting conditions and complex backgrounds as well as recognizing faces under variations in pose, lighting and expression. The system eliminates classical student identification such as calling student names, or checking respective identification cards, which cannot only interfere with the teaching process, but also can be stressful for students during exam session. Its implementation to provide a variable solution towards curbing the rampant examination fraud in Nigeria [7].It is extremely important to apply various image pre-processing techniques to standardize the images that you supply to a face recognition system. There is a great diversity in the way facial appearance is interpreted for recognition by an automatic system [8].

2. Literature survey

An automated fraud detection of hall ticket an offline examination system uses pattern recognition, adaboost algorithm for training the system and detecting fraud and ANN classifier for classification. Pattern recognition is a branch of machine learning that focuses on the recognition of patterns and regularities in data, although it is in some cases considered to be nearly synonymous with machine learning. Pattern recognition systems are in many cases trained from labelled "training" data (supervised learning), but when no labelled data are available other algorithms can be used to discover previously unknown patterns (unsupervised learning) [1]. **AdaBoost**, short for "Adaptive Boosting", is a machine learning meta-algorithm formulated by Yoav Freund and Robert Schapiro who won the Gödel Prize in 2003 for their work. It can be used in conjunction with many other types of learning algorithms to improve their performance. The output of the other learning algorithms ('weak learners') is combined into a weighted sum that represents the final output of the boosted classifier. AdaBoost is adaptive in the sense that subsequent weak learners are tweaked in favour of those instances misclassified by previous classifiers. AdaBoost is sensitive to noisy data and outliers. In some problems it can be less susceptible to the over fitting problem than other learning algorithms

A multi-mode biometrics (fingerprint and face) solution to the problem of examination malpractice examination system. The appearance of both fingerprint scanner and web cam on modern laptop and notebook computers motivate the writing of this paper.[2] Biometric is more reliable and more capable of distinguish between specific individual features.

Credit card fraud detection using iris biometric technique is used for the security purpose. The non-intrusive property of iris recognition leads to several problems to the images of natural-open eyes and it is hard to increase the accuracy of iris recognition because of these problems[3]. In order to ensure the non-intrusive property as well as achieve an iris recognition which has high accuracy simultaneously, this paper presents a novel iris recognition method based on the natural-open eyes. Firstly, makes pre-process to iris image, ensures the effective iris area adaptively. Secondly, finds all iris feature points by directional information, length information, and width information of texture, the neighbouring gray information and relativity in the effective iris area. Thirdly, makes codes to feature points and figures the iris pattern by iris codes. It will sort the different iris patterns by accommodated pattern matching of method.

New automated attendance management marking system. Less time consuming than traditional methods.[4] This system is still lacks the ability to identify each student. This method is used wherever monitoring of attendance required for example schools.

Multimodal biometric technique uses face, iris and finger for fraud detection. This paper presents a new Effective fake detection method that can be used in multiple biometric systems to detect different types of fake access attempts [5]. An important feature and objective of the proposed system is to enhance the image quality and very low degree of complexity for security of biometric recognition frameworks. Computational demands of a multimodal biometric system are good compare with uni-model system.

The problem of examinations malpractices that has been plaguing Nigeria for decades in spite of visible efforts by the stakeholders is examined in this paper. The main fundamental problems are identified as the absence of a credible identity verification system [6]. This has an over bearing effect on knowing who should be where and at what time. Biometrics is considered as an adequate solution, with its proven achievement level in identification and verification of identities effectively answering the question- who you are. A wide variety of techniques have been proposed for feature extraction by using HMM and SVD coefficient. Based on priority here we are taking seven states HMM [7]. When the card is inserted to ATM then it asks the pin number and captures the image. The image features are extracted then compared the image with the image stored in the training data base. If the image is matched then the transaction will proceed. If the image is not matched with the images in database then the transaction will not proceed. Image may be finger print or face. So by using image we can prevent the frauds.

Local binary pattern (LBP) Assigning weights to the different regions improve the recognition performance drastically. This is especially true for faces from which the photos are taken under different lighting conditions. Local Binary Patterns (LBP) method represents the local feature of the face and matches it with the most similar face image in database. The accuracy of the system is above 100%[10,11]. This approach failed to improve the code for face image recognition as well as clean up the code in order to improve the performance.

3. Methodology

In order to detect and recognise the face here we are using the method local binary method. Local Binary Patterns (LBP) is a texture descriptor that can be also used to represent faces, since a face image can be seen as a composition of micro-texture-patterns. Normally, the algorithm performance is compared by means of the detection ratio and false alarm ratio.

Then, general errors in face detection schemes are:-

- False negative: face not correctly detected, due to a low detection ratio.
- False positive: non face detected as face, due to a high false alarm ratio.

A face detection method based on Local Binary Patterns which can be considered as an appearance-based method. This kind of methods normally obtain good results, due to the fact that depending on the variability of the Images/samples collection the face detection and false alarm ratios can be adjusted. Moreover, these methods are efficient in the detection and the computing cost is lower compared with other techniques Local binary pattern is the process in which the image is converted in to array.

Applications local binary pattern:

- Pre-processing.
- Neighborhood topology.
- Thresholding and encoding.
- Feature selection and learning.

3.1 Candidate Registration

The candidate should register and update his/her personal information such as candidate photo, name, semester, year, branch, and USN. The information collected should be stored in the enrolment database. The admin will control over enrolment database. Admin will distribute hall ticket if the candidate is authorized.

There are few internal and external limitations and restrictions in designing the system.

- Internal limitation: The size of the database is for 100 images only. More than 100 images it will not accept the images to store in the enrolment database.
- External limitation: Illumination, lighting.
- The system must be able to identify human faces in live video.
- The system must be able to detect for faces in images as an input and detect for a matching face in a folder, and then show the results.
- The system must be able to draw counters of moving objects in a live video.
- The system must be able to display a live infrared video.

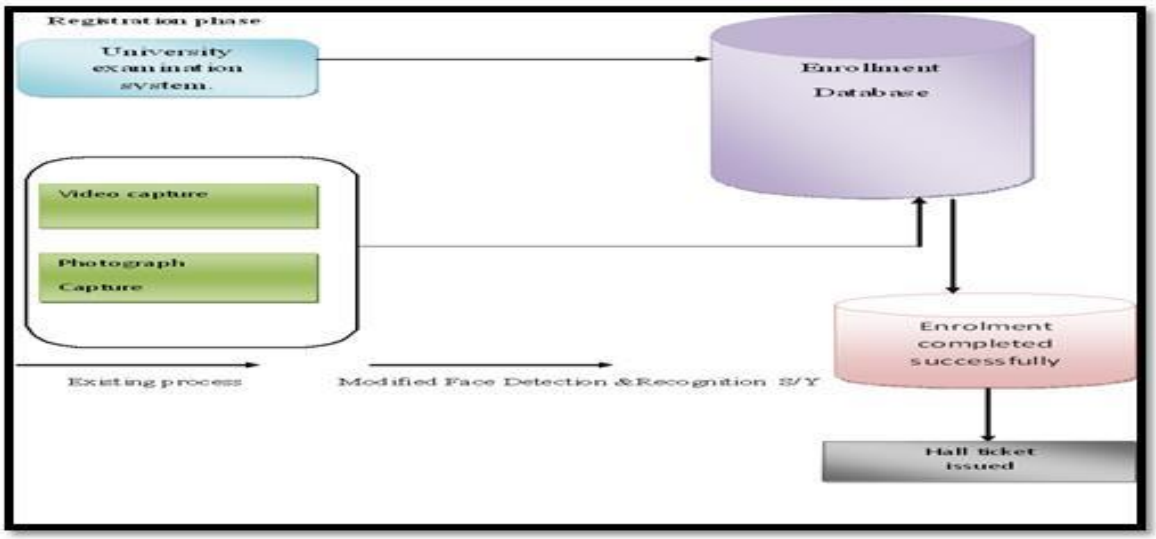

Figure 3.1.1 : Candidate Registration Input data

Colour images are taken as input and extracting the face features that is eyes, nose etc. Differentiate the human face and surroundings. The surroundings data should be eliminated. The face is taken as a triangle format.

Source of input data: Input is taken in the form of video. The taken videos are in the form of frames. Then the RGB images are captured from the video. Those images are compared with the enrolment database. We are taking text data also as input. That is candidate name, usn, branch, semester.

Input and output devices: Input devices are keyboard, web camera and modulator.

- Keyboard: while storing the candidate information we should enter candidate name & USN by using the keyboard.
- Web camera: here the web cam is use to take video and capturing the images.
- Modulator: the modulator will convert the digital signals into analog signals for sending an alarm.

Output device is demodulator which is used to convert the analog signals into digital signals.

The input data is taken as video and capturing into RGB images. The formats of images are dynamic images and static images.

- Dynamic images: Is the amalgamation of digital imaging, image editing, and workflow automation. It is used to automate the creation of **i**mages by zooming, panning, colorize and performing other image processing and colour management operations on a copy of a digital master.
- Static images: Are visual images that do not move. Many of these static images communicate by combining visual elements with words.

Here output is in the form of alarm. If the candidate is not authenticated then alarm is used to send a notification to the room supervisor by the chief examiner. If face detected and not recognized will send a message notification to the chief examiner Coordinator by using alarm. Another output interpretation is face not detected.
If face is detected and recognized will generate a hall ticket and student will be allowed to examination.

Local binary pattern (LBP): Refers to an appearance based-approach to face detection and recognition that sets to capturing the variation in the collection of face images.& use this information to encode and compare images of individual faces in holistic manner.

Threshold: Minimum or maximum value which serves as a benchmark for comparison or guidance and any breach of which may call for a complete review of the situation or the redesign of a system.

imread: Read image from graphics file.
imshow: To displaying the image data, use the imshow function.
imhist: Display the histogram of image data.
imprint: Read the image and prints.

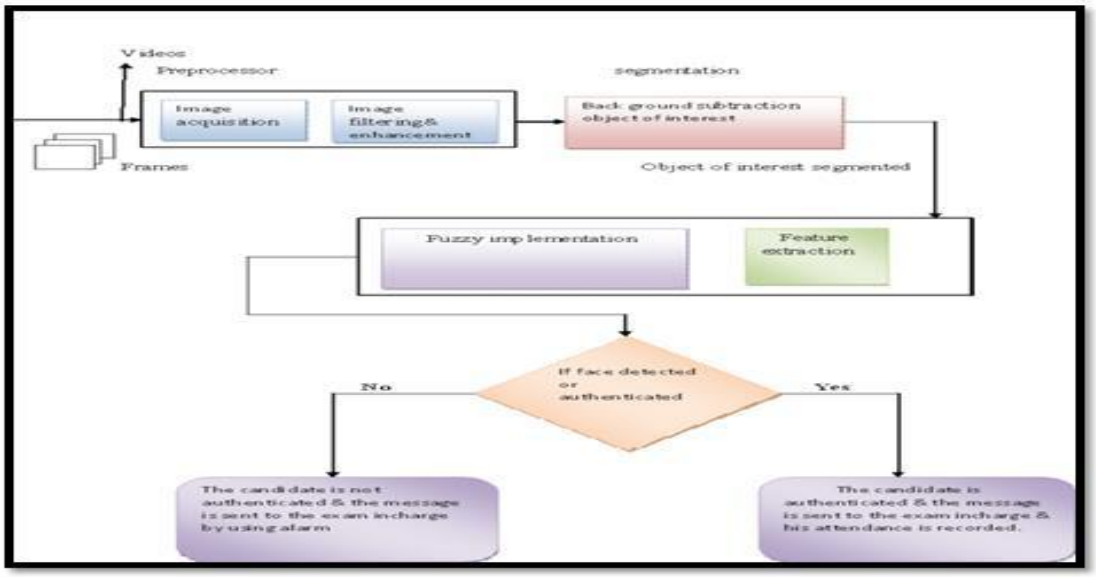

Figure 3.1.2 : Framework for automated face detection and recognition for detecting impersonation of candidate in the examination system.

4. Algorithm

Step1: Pre-processing

The camera images are getting captured from the video sequences which are nothing but a input. The noise is filtered in this process. In pre-processing the captured colour image converted into gray scale image. The gray scale image is again converted into binary image.

In image pre-processing includes two steps:

- ✓ Image acquisition.
- ✓ Image filtering and enhancement.
- ✓ Colour to gray scale

Syntax:

I = rgb2gray (RGB)

newmap = rgb2gray(map)

`I = rgb2gray (RGB)` converts the true color image `RGB` to the gray scale intensity image `I`. The `rgb2gray` function converts RGB images to gray scale by eliminating the hue and saturation information while retaining the luminance.

newmap = rgb2gray (map) returns a gray scale color map equivalent to map

Image acquisition:

Image acquisition in image processing can be defined as the action of retrieving an image from hardware source, so it can be passed through process need to occur.

Image filtering and enhancement:

Read the image into the workspace.

Preprocess the image to enable analysis.

Perform analysis of objects in the image.

Step 2:- Segmentation

Image segmentation is the process of partitioning a digital image into multiple segments (set of pixels). Image segmentation is typically used to locate objects and boundaries in images it will assign to label to every pixel in an image. The result of image segmentation is a set of segments that will collect cover the entire image. The image consists of colour, intensity or texture. The image is subdivided .

Step 3:- Background subtraction object of interest

These techniques have been adopted in many vision-based interfaces to extract or track moving objects of interest in the images; they still suffer from the changes of lighting, such as shadows and highlighting. Finally the real-time segmentation is formed.

Step4:- Feature extraction and Face detection

Face detection:The main objective of the face detection is to find the human faces. Face detection algorithms focus on the detection of frontal human faces. Result indicates that location of the face (which we should identify) in the original image as given in the input. Face detection has wide range of applications and in which that detects human faces so that the camera can set the focus and appropriate exposure for the shot automatically. We have developed a robust, near real-time face detection system from colour images using a skin-tone colour model and facial features. We have also developed a robust face detection module to extract faces from cluttered backgrounds in still images The proposed system not only detects the face, but also locates important facial features, such as eyes and mouth. These features are crucial to the performance of the face recognition. –

Feature Extraction: One very important area of application is image processing, in which algorithms are used to detect and isolate various desired portions or shapes of a digitized image. It is particularly important in the area of optical character recognition/highlighted. Feature selection that deals with extracting features that results in some quantitative of interest or feature that are basic for differentiating face from another object. Our feature extraction system uses a pose invariant property, called the shape index to help identify possible candidate anchor points.

Classification and object of interface recognition:-

Recognition is the process that assigns a label to an object based on its description. We conclude our coverage of digital image processing with the development of methods for recognition individual objects. Classification can be done by using ANN classifier.

5. Results

The below fig 5.1 shows the how the face is detected and recognized in front of web camera. And how it is going to generate an hall ticket to the candidate.

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELGAUM

ADMISSION TICKET FOR B.E/B.Arch EXAMINATION DEC - 2013

1. UNIVERSITY SEAT NO. : 3BR12CS052 No : 10356757

2. NAME OF THE CANDIDATE : GUDIPATI ASHALATHA

STUDENT COPY

3. SUBJECTS APPLIED

10CS32 10CS33 10CS34 10CS35 10CS36 10CSL37 10CSL38

10MAT31

Note: Please verify the eligibility of the candidate before issuing the admission ticket.
This is Electronically Generated HallTicket

Signature of the Candidate Signature of the Principal with Seal. Registrar (Eval)/Special Officer

Candidate must read the instructions provided in the answer booklet, before the commencement of examination.

Figure 5.1:Hall ticket for the candidate

- In the above figure shows the hall ticket for the candidate.
- Here two level of fraud checking can be going on. First level is hall ticket generation and second level is fraud detection and recognition through web came.
- The admin have to come along with hall ticket.

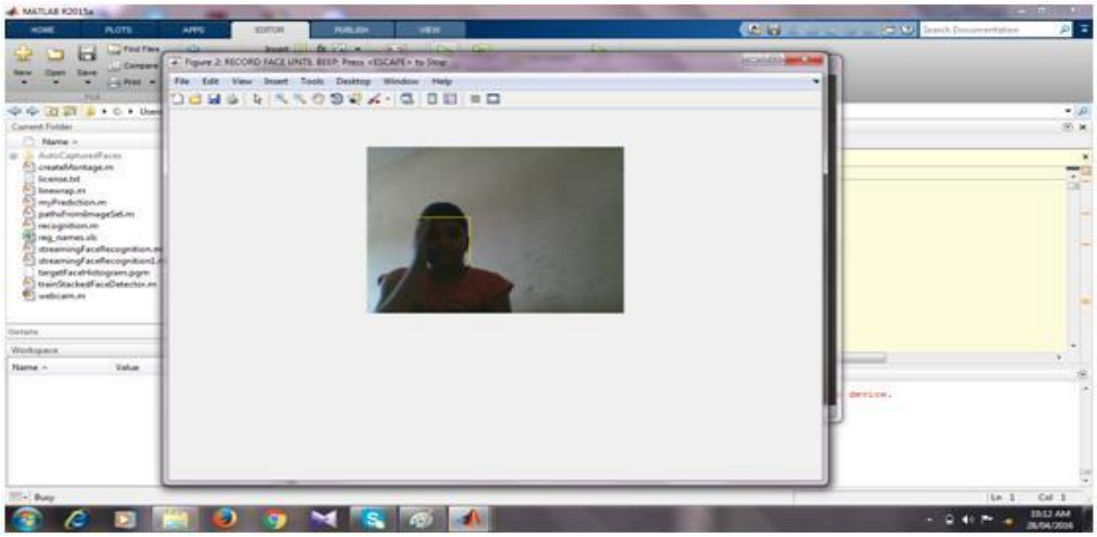

Figure 5.2:Different angles of candidate in front of web camera

- In the above figure shows the different angle of candidate in front of camera.
- In the above figure candidate face is detected. That is it will take a face to detect at any angles of candidate.

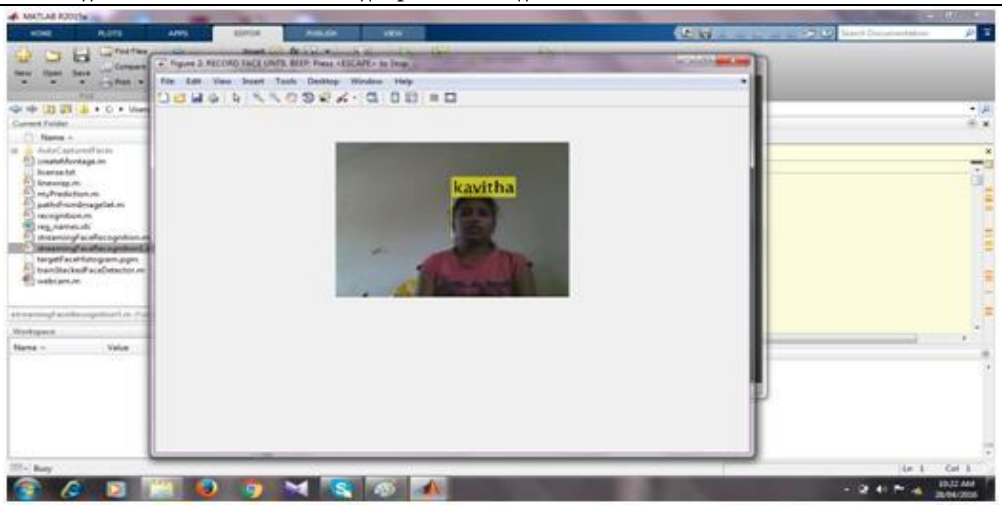

Figure 5.3 : Recognition of one candidate

The above fig 5.3 shows the recognition of one candidate in front of web camera. That is in the above figure the person is authenticated then the candidate name is displayed.

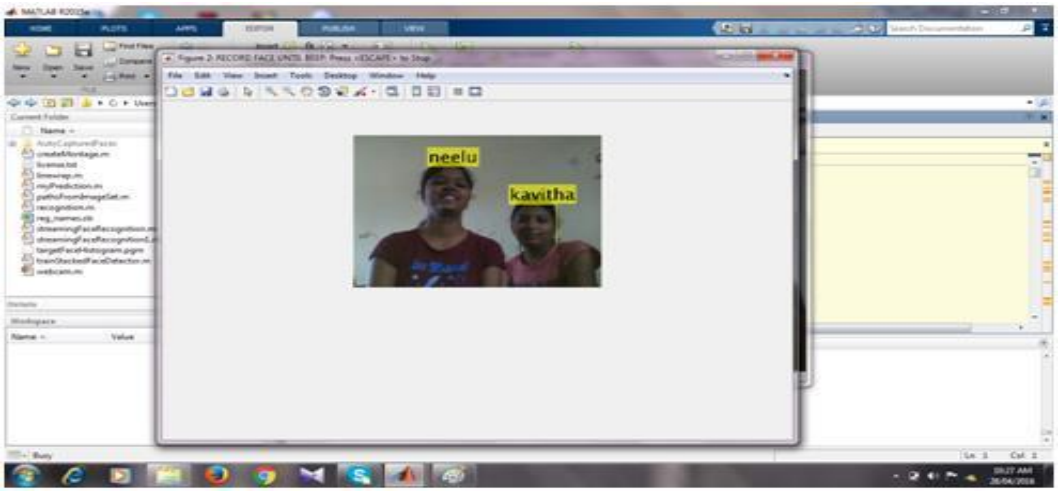

Figure 5.4: Recognition of two candidates

The above fig 5.4 shows the recognition of two candidates in front of web camera. In the above figure the person is authenticated then the candidate names are displayed.

Figure 5.5: GSM interfaces with system

The above Fig 5.5 shows the GSM interfaces with system.In the figure the hardware kit(GSM) is connected with the system to generete an message for person is not authenticated.

6. Conclusion

Robust Automated Face Detection & Recognition system is developed and employed for Detecting Impersonation of Candidates in the examination system. Candidate Identity based on face detection using LBP is implemented and on successful detection a message is sent to the room supervisor indicating authentic candidate and further attendance can be recorded. Further if a face is detected is not recognized, when compared with the enrolment database, then a fraud is detected with respect to impersonation and a message is sent to the chief examiner and also to the room supervisor.

Future Scope

- This project further implemented in online examination system.
- This project we can implement for passport verification. In passport verification the images in adhaar card, voter id should be compared with the input images. We no need to create a database for images because we are directly comparing with the images which are already present in voter id and Adhar card.

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