

# Automated Face Detection & Recognition for Detecting Impersonation of Candidate in Examination System

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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. Existing examination system mainly deals with document image analysis techniques and biometric system in identification, recognition and classification of the candidate. Generally fraud is detected by using document image analysis where as the proposed model is focus 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:**Preprocessing, segmentation, face detection & feature extraction, classification and recognition.

## I. Introduction

The major problem that occurs in examination system is malpractices. This 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 liveness detection technique is used to detect the fake biometrics. A biometric system should have the uniqueness, stability, collectability, performance, acceptability and forgeresistance. 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. Our 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 this paper 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. We are interested in addressing the problem of detecting faces in color images in the presence of various lighting conditions and complex backgrounds as well as recognizing faces under variations in pose, lighting and expression. This 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]. This paper presents identity smart examination system as a viable solution which is proposed after a careful under study and analysis of the problems as capable of keeping the vice under control. 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.

## **II. Related work**

Face recognition shares a rich common literature with many of the domains. For recognition faces in video, face tracking is necessary, they are many dimension while recognizing the faces there are problems we are going estimate these different head poses [9]. The camera should be installed in the examination hall which detects the faces [5]. Features such shape, histogram, texture, color, etc these are extracted from faces [1]. In order to realize exactly, matching it should eliminate the factors link noise, background image etc by using image pre-processing [4]. Outlier detection is method which solves the problem of finding patterns in data that do that do not conform to expected normal behavior [8]. It takes more time to detect the fraud it's insufficient so we are using video as input which nothing but image. Identification involves a one-to-more comparison of an individual's face against all faces in a database in order to determine the identity, and verification characterized as a one-to-match of individual's faces to his or her stored in the database [2]. Now days we are using finger print analysis, iris recognition using biometrics system being used to detect the fraud in examination, credit cards, ATM's etc. Use of identity card to detect the fraud of hall tickets to detect the fraud. The presences of invigilators to identify the fake students. The allocation of setting arrangement member that determines the hall where the student will write the exam and the need to sign in and out on the attendance sheets. There has been a persistence increase in the member of reported examination malpractice cases since year 2000. There are 40,805 malpractice cases in the senior school certificate examinations conducted by the NECO and this figure has grown to 469,582 cases in 2007. These figures show an annual increase of about 167% and candidates caught in the act is up by about 15% within the same time frame. The 1 million candidates register for this examination yearly, this implied about

50,000 candidates are caught every year. The below table speaks about the researchers who have done the face detection and face recognition.

**Table1: Literature survey**

Sl.no	Title	Author	Method	Advantages	Disadvantages	Applications
1	An automated fraud detection of hall ticket an offline examination system using ANN classifiers.	Shridevi Soma (cse, PDACE , Kalburgi) & Vidyashree SA (cse, PDACE, Kalburgi).	Pattern recognition, adaboost algorithm, ANN classifier.	It is used to detect whether the person is authorized to write the exams by using his/her hall ticket.	Only by the hall ticket we can't find whether the person is authenticated or not.	This system can be used in both online & offline examination system.
2	Multimode biometric solution for examination malpractices in Nigerian schools	Olufemi Sunday Ad Coye (cse, university of UGO).	Multimode biometric fusion	Biometric is more reliable and more capable of distinguish between specific individual features.	Biometric is an oldest method through human beings have been identifying themselves.	This can be used in examination system.
3	Fraud detection based online test and behavior identification implementing visualization technique.	Harish Babu, Kalidasu, B. Prasanna kumar, Haripriya Priyadarshini institute of technology & science.	Authentication techniques.	Authentication can be done by using passwords & username.	There is a possible of password tracking and it is risk.	This can be used in any verification system example ATM.
4	Credit card fraud detection using iris biometric technique.	Mrs. Sayalee p. Deshmukh , Dr. S.H. Patil.	The novel iris detection method is used.	It will sort the different iris patterns by accommodated pattern matching of method.	Sometime this pattern matching method may fails as false acceptance rate & false rejection rate.	Fraud detection in credit cards.
5	Face detection system for attendance of class students.	Mohammad Fuzail, Hafiz Mohammad Fahad Nounan, Mohammad Omarmush tag.	New automated attendance management marking system.	Less time consuming than traditional methods.	This system is still lacks the ability to identify each student.	This method is used wherever monitoring of attendance required for example schools.
6	An efficient biometric	S. Wilson and A. Lenin	Multimodal biometric	Computational demands	Time consuming is	New effective fake

	multimodal face, iris & finger fake detection using an adaptive Neuron Fuzz infernal system.	Fred		of a multimodal biometric system are good compare with uni model system.	more when more than one biometric is grouped.	detection method that can be used in multiple biometric systems to detect different type of fake access attempts.
7	Implementing biometrics to curb examination malpractices in Nigeria.	O.A.Odejobi and N.L.Clarke	Curb examination malpractices by implementing biometrics.	It eliminates the impersonation in examination system.	It still suffers the weakness peculiar to every human supervised security.	Stockholders uses this system.
8	Image based fraud prevention	D. Madhu Babu, M. Bhagyasri, K.Lahari, C.H. Madhuri, G. Pushpa kumari.	Outlier analysis	It will provide security for the online transactions based on image.	It will not work out for large & more complicated database.	This can be used in companies in order to provide security by allowing authorized persons.
9	Face recognition and its applications	Andrew w. senior and Ruud M. Bole	Face recognition technology for expanding the accuracy and capabilities of this biometric domain.	Verification system for physical and electronic access security.	The threat of passive customization and automated surveillance systems.	This has been used as a black-and-white mug shot identification system.
10	Face Recognition Across Pose and Illumination.	Ralph Gross, Simon Baker, Iain Matthews, and Takeo Kanade	appearance-based algorithms	better performance on normalized images across all probe poses.	this task recognition accuracies are significantly lower, suggesting that there still is room for improvement	This method was used in the most recent Face Recognition Vendor Test to create frontal view images from rotated views.
11	A New Technique for LBP Method to Improve Face Recognition	Anagha V. Ma Ikapurkar <sup>1</sup> , Rupali Patil <sup>2</sup> , Prof. Sachin Murarka <sup>3</sup>	Local binary pattern (LBP) Method	Assigning weights to the different regions improves the recognition performance drastically.	The recognition performance only slightly decreases.	It is used in real world applications

				This is especially true for faces from which the photos are taken under different lighting conditions.		
12	Face Recognition using Local Binary Patterns (LBP)	By Md. Abdur Rahim, Md. Najmul Hossain, Tanzillah Wahid & Md. Shafiul Azam.	Local Binary Patterns (LBP)	This 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% .	This is failed to improve the code for face image recognition as well as clean up the code in order to improve the performance.	It is used in real world applications.
13	Local Binary Patterns for Still Images	Wikipedia	Image analysis	it has extended for color (multi channel) Images as well as videos and volumetric data.	It does not support for the threshold pixles.	It is used in Texture Spectrum model.

**Summary of the literature survey.**

### **III. Proposed system**

The main objective of this work is:

Face detection and recognition system for identity verification and attendance monitoring in the examination system. Fraud with respect to hall tickets and designs an automated system for impersonation or cross checking hall tickets using image processing techniques. The major problems occur in examination systems are malpractices. The fundamental Problem identified is the absence of a credible identity verification system for offline and also for online examination system. The solution for

this problem is an examination system designed based face detection and verification technology incorporating the security strength of examination and the accuracy. Impersonation is nothing but to pretend to be for purposes of fraud or to assume the character or appearances of especially fraudulently, which is one of the main problems to be addressed in our project. Secondly in case of impersonation is detected whether the candidate is authenticated or not. If the person is authenticated his attendance also recorded. The message has to be sent to the exam in

charge by using alarm whether the candidate is authenticated or not.

**Some of the challenges that comes across the construction of overall system:**

**The image quality:** the primary requirement of the face recognition system suspect's good quality face image and a good quality image is the one which is collected under expected conditions. For extracting the image features the image quality is important. Without the accurate computations of the facial features the robustness of the approaches will also be lost.

**Illumination problem:** same face appears differently due to change in lighting. Illumination can change the appearance of an object drastically. We must overcome irregular lighting.

**Pose variation:** usually the training data used by the face recognition systems are frontal view face images of individuals. Frontal view images contain more specific information of a face than a profile or other pose angle images. The problem appears when the system has to recognize a rotated face using this frontal view training data. Users need together multiple views of an individual in the face database.

The problems in existing system are malpractices. The main problem is identified as the absences of a credible identify verification system. In order to overcome these problems we are implementing this face detection & face recognition project. Not only in examination system but also in attendance monitoring we can use this face detection & face recognition. The main purpose of this system is to find impersonation in examination system. We can apply this in credit cards and wherever the authenticating required.

This methodology comprises two steps:

1. Enrolment
2. Authentication

**Enrolment**

The enrolment process is divided into two stages the online registration and the face detection enrolment. During the online registration stage individual candidates will be required to register using a web form to submit their personal information as well as the subjects for which they wish to sit for during examinations. This data is centrally stored. The input which we have given is compared with

known database if they both matched then hall ticket will be issued otherwise message will be sent to the exam in charge. The Enrolment steps as shown in the Figure [1].

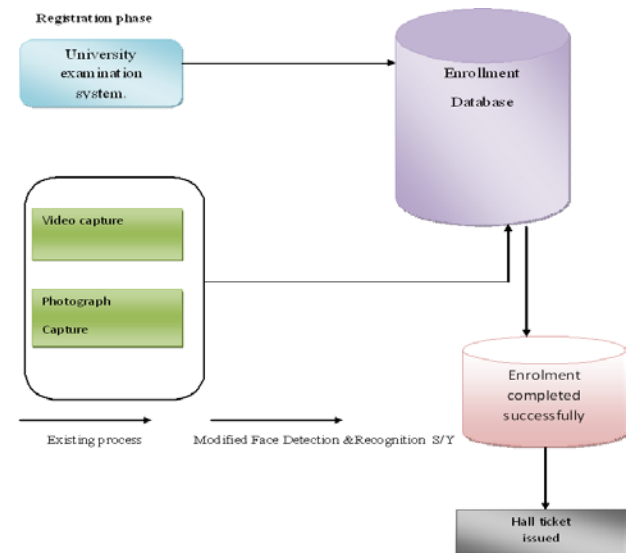


Figure1: Registration phase

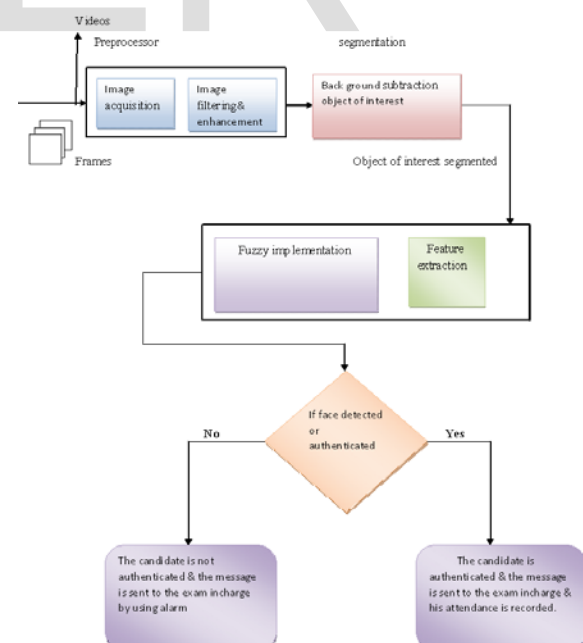


Figure2:SIGNIFICANCE OF PROJECT

### **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 color image converted into gray scale image. The gray scale image is again converted into binary image.

In image pre-processing includes two steps

1. Image acquisition
2. Image filtering and enhancement

#### **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:**

1. Read the image into the workspace
2. Preprocess the image to enable analysis
3. Perform analysis of objects in the image

### **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 color, intensity or texture. the image is subdivided into

#### **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.

#### **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 color images using a skin-tone color model and facial features. We have also developed a robust face detection module to extract faces from cluttered backgrounds in still images



**Figure3:Feature Extraction**

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:-** The above Figure[3] shows the 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.

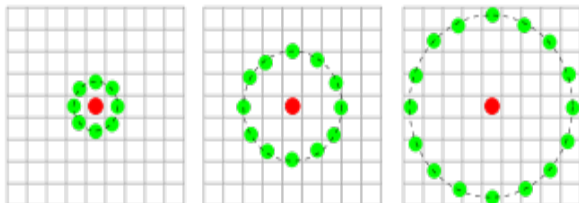
Recognition and description:-In this step the detected face is compare with the database of the known faces. It is analogous to image detection in which the image of the person is matched bit by bit. Image matches with the image stores in database. Finally the face is detected.This five steps shown in the above Figure [2].

### **Local binary pattern:**

Local binary pattern is an image operator used to transform an image in to an array.

LBP is most widely used operator for image analysis and various computer vision tasks. Flexibility in LBP operator has made the success of LBP in numerous computer vision applications and made it suitable for the need of an application. Robustness to gray scale changes for example illumination changes is the most important property of LBP. Another important property of LBP is computationally simple and hance makes it suitable for real world application:-

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



**Figure4:** Three neighborhood examples used to define a texture and calculate a local binary pattern (LBP).

The LBP feature vector, in its simplest form, is created in the following manner:

- Divide the examined window into cells (e.g. 16x16 pixels for each cell).
- For each pixel in a cell, compare the pixel to each of its 8 neighbors (on its left-top, left-middle, left-bottom, right-top, etc.). Follow the pixels along a circle, i.e. clockwise or counter-clockwise.

- Where the center pixel's value is greater than the neighbor's value, write "0". Otherwise, write "1". This gives an 8-digit binary number (which is usually converted to decimal for convenience).
- Compute the histogram,over the cell, of the frequency of each "number" occurring (i.e., each combination of which pixels are smaller and which are greater than the center). This histogram can be seen as a 256-dimensional feature vector.
- Optionally normalize the histogram.
- Concatenate (normalized) histograms of all cells. This gives a feature vector for the entire window.

### **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.

### **IV.Applications**

1. For identity verification and attendance monitoring in the examination system:There are many ways in which an organisation can monitor attendance. This will vary from business to business, some may just use an attendance sheet, some may use online and recently a lot of businesses have been using finger print recognition which can be very reliable.
2. Fingerprint recognition: Fingerprint recognition or fingerprint authentication refers to the automated method of verifying a match between two human fingerprints. Fingerprints are one of many forms of biometrics used to identify individuals and verify their identify.
3. Security: Security has two dialogues. Negative dialogue is about danger, risk, threat and etc. Positive dialogue is about opportunities, Interests, profits and etc. Negative dialogue needs military equipment, armies, police. Positive dialogue needs social capital, Education, social interaction
4. Smart Cards: Smart card technology



makes use of embedded integrated circuit chip that can be either a secure microcontroller or equivalent intelligence with internal memory or memory chip alone. The range is typically one-half to three inches for non battery-powered cards, ideal for applications such as building entry and payment that require very fast card interface.

5. Surveillance: Is the monitoring of the behavior, activities, or other changing information, usually of people for the purpose of influencing, managing, directing, or protecting them. This can include observation from a distance by means of electronic equipment (such as CCTV cameras). Surveillance is used by governments for intelligence gathering, the prevention of crime, the protection of a process, person, group or object, or for the investigation of crime. It is also used by criminal organizations to plan and commit crimes such as robbery and kidnapping, by businesses to gather intelligence, and by private investigators.
6. Multimedia Others: Multimedia is content that uses a combination of different content forms such as text, audio, images, animation, video and interactive content. Multimedia contrasts with media that use only rudimentary computer displays such as text-only or traditional forms of printed or hand-produced material.

## V. 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.

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