INTRODUCTION

Face detection is a computer technology that determines the locations and sizes of human faces in arbitrary (digital) images. It detects facial features and ignores anything else, such as buildings, trees and bodies. Human face perception is currently an active research area in the computer vision community. Human face localization and detection is often the first step in applications such as video surveillance, human computer interface, and face recognition and image database management. Locating and tracking human faces is a prerequisite for face recognition and/or facial expressions analysis, although it is often assumed that a normalized face image is available.

It is the task of identifying already detected objects a known or unknown face. Often the problem of face recognition is confused with the problem of face detection Face Recognition on the other hand is to decide if the "face" is someone known, or unknown, using for this purpose a database of faces in order to validate this input face.

Computer scan detect a person's face using a digital image or video. It may be done by comparing the image captured in the real time with the database image. The facial characters obtained from a real time image is to be compared with the facial characters of the database image stored. Instead of requiring people to place their hand on a reader or precisely position their eye in front of a scanner, face recognition systems take pictures of people's faces, and in schools the automated attendance management system gives a facility to the faculties to reduce the burden in taking attendance. This system takes the attendance automatically using face recognition. However, it may be difficult to estimate the attendance using each result of face recognition independently because of the high the face detection rate.

It is mainly used in airports were it will recognize the face and we can avoid some unwanted terrorist. When compared with other biometrics systems using fingerprint and iris, face recognition has different advantages because it is without touching the person. Trough Face images we can capture the person identification from a distance without touching or interacting with them. And also face recognition is used for crime restriction purpose because face images that have been recorded and archived, so that it will help us to identify a person later.

1.1 About project

What is face recognition?

A **facial recognition system** is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. There are multiple methods in which facial recognition systems work, but in general, they work by comparing selected facial features from given image with faces within a database. It is also described as a Biometric Artificial Intelligence based application that can uniquely identify a person by analyzing patterns based on the person's facial textures and shape.

1.1.1 **Face recognition Challenges**

The usage of face recognition is crucial in quite a few applications, for instance - photo retrieval, surveillance, authentication/access control systems etc. But, it is yet to completely overcome the challenges which have constantly played with its quality of delivery. The study and analysis of faces captured by digital cameras address a wide range of challenges, the below are has direct impact on the computer face detection and recognition.

- **Illumination**

For instance, a slight change in lighting conditions has always been known to cause a major impact on its results. If the illumination tends to vary, then; even if the same individual gets captured with the same sensor and with an almost identical facial expression and pose, the results that emerge may appear quite different.

- **Background**

The placement of the subject also serves as a significant contributor to the limitations. A facial recognition system might not produce the same results outdoors compared to what it produces indoors because the factors - impacting its performance - change as soon as the locations change. Additional factors, such as individual expressions, aging etc. contribute significantly to these variations.

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- **Occlusion**

Occlusions of the face such as beard, moustache, accessories (goggles, caps, mask etc.) also meddle with the evaluation of a face recognition system. Presence of such components makes the subject diverse and hence it becomes difficult for the system to operate in a non-simulated environment.

- **Pose variations**

Heads movements, which can be described by the egocentric rotation angles, i.e. pitch, roll and yaw or camera changing point of views could lead to substantial changes in face appearance and shape and generate intra-subject face's variations. Facial Recognition Systems are highly sensitive to pose variations. The movements of head or differing POV of a camera can invariably cause changes in face appearance and generate intra-class variations making automated face recognition across pose a tough nut to crack.

- **Facial expression charges**

Some more variability in the face appearances could be caused by changes of facial expressions induced by varying person's emotional states. Hence, efficiently and automatically recognizing the different facial expressions is important for both the evaluation of emotional states and the automated face recognition. In particular, human expressions are composed of macro-expressions, which could express, e.g., anger, disgust, fear, happiness, sadness or surprise etc.,

- **Ageing of the face**

Another reason of face appearances changes could be engendered by the ageing of the human face. Aging is an inevitable natural process during the lifetime of a person as compared to other facial variations. Aging effect can be observed under main three unique characteristics:

i) The aging is uncontrollable: It cannot be advanced or even delayed and it is slow and irreversible.

ii) The aging signs depend on time: The face of person at a specific age will affect all older faces, but unaffected in younger age.

- **Availability and quality of face datasets**

Each Face recognition system requires an available, reliable and realistic face database in order to perform the face search within it. Hence, the quality such as completeness as well as accuracy and the characteristics like varying image file format and color/grey level, face resolution etc.,

- **Image resolution and modality**

Face recognition system performance are related to the quality and resolution of the face image and/or to the set up and modalities of the digital capturing the face. For this purpose, standard system can developed to specify scene and photographic requirements as well as face image format for FR, especially in the contexts of biometrics.

1.1.2 Applications of face recognition

- **Access and security**

Facial biometrics can be integrated with physical devices and objects. Instead of using passcodes, mobiles phones and other consumer electronics will be accessed via owner's facial features.

- **Criminal identification**

Face tech can be used to keep unauthorized people out of facilities; surely it can be used to help put them firmly inside them. The FBI currently has a database which includes half of the national population's faces. This is as useful as it is creepy, giving law enforcers another way of tracking criminals across the country.

- **Healthcare**

Instead of recognizing an individual Face, medical professionals could identify illnesses by looking at a patient's features. Another application of facial biometrics within healthcare is to secure patient data by using a unique patient photo instead of passwords and usernames.

- **Payments**

It doesn't take a genius to work out why businesses want payments to be easy. Online shopping and contactless cards are two examples that demonstrate the postmodern purchases. Customers open the app to confirm a payment using their camera. Facial recognition is already used in store and at ATMs, but the next step is to do the same for online payments.

1.2 Purpose

This system is developed mainly for the purpose of automatically identify a person through a digital image or video using openCV technique, which is a leading domain in machine learning

- This system can be used for security purposes in organizations and in secured zones.
- In this system can stores the faces that are detected and can be used for future use as evidence.
- The system is convenient and secure for the users.
- It saves their time and efforts.

1.3 Existing problem

Manually detecting multiple faces in Olympic Games or recognizing multiple students in colleges is one of the hectic tasks now a day, in many access control systems like ATM, mobile and computer systems we are presently using fingerprints which may not be more secured.

1.4 Area of Improvement

The future work needs efficient segmentation method that can segment each face without any overlapping or missing parts. Using algorithm we have to recognize the faces accurately.

1.5 Scope of work

Face recognition has become a popular topic of research recently due to increases in demand for security as well as the rapid development of mobile devices. There are many applications which face recognition can be applied to such as access control, identity verification, security systems, surveillance systems, and social media networks. Access control includes offices, computers, phones, ATMs, etc. Most of these forms currently do not use face recognition as the standard form of granting entry, but with advancing technologies in computers along with more refined algorithms, facial recognition is gaining some traction in replacing passwords and fingerprint scanners.

LITERATURE REVIEW

Literature Review provides a brief survey to the various existing methods available in literature for real time face recognition. A good number of methods for face recognition exist in the literature. There are lot of works are being carried out on facial recognition techniques, various techniques are used to recognize the face in a video or in an image. This section reviews the few of the related works to our project.

Ranganatha S1 , Dr.Y P Gowramma [April 2015] were proposed that the demand for biometric security system has risen due to a wide range of surveillance, access control and law enforcement applications. Among the various biometric security systems based on finger print, iris, voice or speech and signature, face recognition seems to be easily accessible, non-intrusive, and most universal system. It is easy to use, can be used efficiently for mass scanning which is quite difficult in case of other biometrics, and also increases user friendliness in human computer interaction. Several interesting research attempts are made in the field of face recognition. There are three main divisions of face recognitions based on the face data acquisition type: methods that deal with intensity images, those that operate on video sequences and those that are based on other sensor inputs. This paper provides an overview of few widely used methods in each of these divisions along with the advantages and disadvantages.

Sarala A.Dabhade (M.Tech student)[Aug 2012] proposed an article on the real time face detection and recognition using Haar-Based Cascade Classifier and Principal Component Analysis(published by International journal of Computer Science and management Research) Face is a complex multidimensional visual model and developing a computational model for face recognition is difficult. The paper presents a methodology for face recognition based on information theory approach of coding and decoding the face image. Proposed methodology is connection of two stages – Face detection using Haar Based Cascade classifier and recognition using Principle Component analysis. Study of the paper include the system to find the locations of Log-Gabor features with maximal magnitudes at single scale and multiple orientations using sliding window -

based search and then use the same feature locations for all other scales. The goal is to implement the system (model) for a particular face and distinguish it from a large number of stored faces with some real-time variations as well. Keywords: Haar Based Cascade Classifier, Principal Component Analysis, Sliding window algorithm, LogGabor Filter.

Madan Lal, Kamlesh Kumar [Vol. 9, No. 6, 2018] proposed an article on the real time face detection and recognition using Haar-Based Cascade Classifier and Principal Component Analysis(published by (IJACSA) International Journal of Advanced Computer Science and Applications) With the rapid growth in multimedia contents, among such content face recognition has got much attention especially in past few years. Face as an object consists of distinct features for detection; therefore, it remains most challenging research area for scholars in the field of computer vision and image processing. In this survey paper, we have tried to address most endeavoring face features such as pose invariance, aging, illuminations and partial occlusion. They are considered to be indispensable factors in face recognition system when realized over facial images. This paper also studies state of the art face detection techniques, approaches, viz. Eigen face, Artificial Neural Networks (ANN), Support Vector Machines (SVM), Principal Component Analysis (PCA), Independent Component Analysis (ICA), Gabor Wavelets, Elastic Bunch Graph Matching, 3D morphable Model and Hidden Markov Models. In addition to the aforementioned works, we have mentioned different testing face databases which include AT & T (ORL), AR, FERET, LFW, YTF, and Yale, respectively for results analysis. However, aim of this research is to provide comprehensive literature review over face recognition along with its applications. And after in depth discussion, some of the major findings are given in conclusion.

Srikanth Sriram [Volume 104 – No 10, October 2014] proposed Real Time Smile Detection using Haar Classifiers on SoC. The journal published in International Journal of Computer Applications (0975 – 8887) proposed by Smile detection in real time video is an interesting problem with many potential applications. This paper is intended to implement a real time smile detection from video using Haar Classifiers through Raspberry Pi BCM2835 processor which is a combination of SoC with GPU based Architecture. For capturing video we used Raspberry Pi Camera Board of 5MP and which plugs directly into the CSI connector on the Raspberry Pi. Computer vision OpenCV libraries with python IDE is used for face detection and smile detection

through linux based raspbian operating system. Frame rates of various video resolutions during smile detection in Raspberry Pi are also observed. The present method can be used in low cost robotic computer vision applications, human computer interaction (HCI) and in education as well because cheap and small hardware used.

PROJECT ANALYSIS

Robust and real-time face detection plays a vital role in many of the application scenarios like in biometrics, often as a part of (or together with) a facial recognition system. It is also used in video surveillance, human computer interface and image database management. Some recent digital cameras use face detection for autofocus. Face detection is also useful for selecting regions of interest in photo slideshows that use a pan-and-scale Ken Burns effect. Face detection is gaining the interest of marketers. A webcam can be integrated into a television and detect any face that walks by. The system then calculates the race, gender, and age range of the face. Once the information is collected, a series of advertisements can be played that is specific toward the detected race/gender/age. This paper shows prototype or partial implementation of this type of work. Face detection is also being researched in the area of energy conservation.

3.1 Face Recognition

In previous years, the performance of face recognition algorithms has increased a great deal. The significance of face recognition is due to its technical challenges and wide potential application. The first popular face recognition technique is Eigenface (Principal Component Analysis). It can be pictured as a single layer linear model. Fisherface (Linear Discriminant Analysis) is also a single layer linear model. Laplacianface (Locality Preserving Projection) also used linear features. Then, many handcrafted local nonlinear feature based methods emerged, such as Local Phase Quantization (LPQ, Local Binary Patterns (LBP) and Fisher vectors. These hand crafted features achieved excellent face recognition performance, however it decreased considerably in unconstrained environments where the face images cover intra-personal variations like, pose, illumination, expression and occlusion as shown in Labeled Faces in the Wild (LFW) benchmark.

In last few years, deep learning methods, especially CNN has achieved very impressive results on face recognition in unconstrained environment. The main benefit of CNNs is that all the processing layers, even the pixel level input have configurable parameters that can be learned from data. This averts the necessity for hand crafted feature design, and replaces it with supervised data driven learning of features. CNN learning based features are more resilient to complex intra-

personal variations CNN methods have attained the best three face recognition rates on the FRUE benchmark database LFW (Labeled Faces in the Wild).

3.2 Face Detection

Face detection is a well-known and studied topic, which has gained widespread attention and usage, especially since the work of Viola and Jones. However, there are still issues with non-frontal poses and occlusions, especially in a video-surveillance context. We present here a technique based on the popular boosted cascade of Viola and Jones, with a probabilistic formulation that can handle these issues, from Bourges et al. [2]. Our method focuses on challenging situations encountered in actual cases: dense scenes (large number of people in a short period of time) with especially small faces (in resolution) and erratic pedestrian movements. To efficiently cluster face detections occurring in these types of videos, we use all the available information: time stamp, position in the frame and appearance provided by the video. Our approach [9] is global; it takes into account all the face detections to group them in a trajectory. This is not done in standard multi-face tracking. Viola and Jones [7] proposed the algorithm for face detection. The algorithm is scanning a sub-window capable of detecting faces across a given input image. The Viola-Jones face detector contains three main ideas that can run in real time: the image integral, classifier learning with AdaBoost, and the intentional cascade structure.

In this section, the base algorithm used to detect the face is discussed. AdaBoost algorithm is discussed first then feature selection is discussed.

Video contains huge amount of information at different levels in terms of scenes, shots and frames. To discover knowledge from videos the issue that needs to be addressed is the elimination of redundant information. The Objective is to remove the redundant data which will significantly reduce the amount of information that needs to be processed. So, key frame extraction is the fundamental step in any of the video retrieval applications. It is necessary to discard the frames with repetitive or redundant information during the extraction. In recent years, many algorithms of key frame extraction focused on original video stream have been proposed. This paper provides an extensive survey in this area to bring out the advantages, drawbacks, suitability to an application, and precision of each method for video retrieval systems. Key frame is the frame which can represent the salient content of the shot. The key frames extracted must summarize the characteristics of the video, all the key frames on the time sequence gives visual summary of the

video to the user. There are great redundancies among the frames in the same shot, so only those frames that best reflect the shot contents are selected as key frames to represent the shot. The extracted key frames should contain as much salient content of the shot as possible and avoid as much redundancy as possible. The features used for key frame extraction can include colors (particularly the color histogram), edges, shapes, optical flow, MPEG motion descriptors, MPEG discrete cosine coefficient, motion vectors, camera activity etc.

The frames at the turning point of the motion acceleration and motion deceleration are selected as key frames. The key-frame selection process is threshold free and fast and the extracted key frames are representative. By focusing the analysis on the compressed video features, paper introduces a real-time algorithm for scene change detection and key-frame extraction that generates the frame difference metrics by analyzing statistics of the macro-block features extracted from the MPEG compressed stream. The key-frame extraction method is implemented using difference metrics curve simplification by discrete contour evolution algorithm. This approach resulted in a fast and robust algorithm. Key frames are extracted utilizing the features of I-frame, P-frame and B-frame for each sub-lens. Key frames can also be extracted based on macro-block statistical characteristics of MPEG video stream. The frame difference metrics are generated by analyzing statistics of the macro-block features extracted from the MPEG compressed stream. The key-frame extraction method is implemented using difference metrics curve simplification by discrete contour evolution algorithm.

3.3 Existing System

Facial Recognition methods

Recognition algorithms can be divided into two main approaches: i) geometric which looks at distinguishing features (feature based) and ii) photometric which is a statistical approach that distill an image into values and compares the values with templates to eliminate variances (viewbased). Popular recognition algorithms Principal Component Analysis and Linear Discriminate Analysis are based on geometric approach. Elastic Bunch Graph Matching and the Hidden Markov model are based on statistical approach.

i) Principal Component Analysis (PCA)

PCA involves a mathematical procedure that transforms a number of possibly correlated variables into a smaller number of uncorrelated variables called principal components. The first principal component accounts for as much of the variability in the data as possible and each succeeding component accounts for as much of the remaining variability as possible. PCA is mostly used as a tool in exploratory data analysis and for making predictive models. PCA involves the calculation of the eigen value decomposition of a data covariance matrix or singular value decomposition of a data matrix.

PCA is mostly used as a tool in exploratory data analysis and for making predictive models. PCA involves the calculation of the Eigen value decomposition of a data covariance matrix or singular value decomposition of a data matrix. PCA is the simplest of the true eigenvector-based multivariate analysis. Often, its operation can be thought of as revealing the internal structure of the data in a way which best explains the variance in the data. If a multivariate dataset is visualized as a set of coordinates in a high-dimensional data space (one axis per variable), PCA supplies the user with a lower-dimensional picture, a "shadow" of this object when viewed from its (in some sense) most informative viewpoint.

ii) **Linear Discriminate Analysis (LDA)**.

LDA is a method to find a linear combination of features which characterize or separate two or more classes of objects or events. The resulting combination may be used as a linear classifier. In computerized face recognition, each face is represented by a large number of pixel values. Linear discriminant analysis is primarily used here to reduce the number of features to a more manageable number before classification. Each of the new dimensions is a linear combination of pixel values which form a template.

3.4 Proposed System

In Face recognition Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. Systems design could

be seen as the application of systems theory to product development. The proposed automated attendance system can be divided into four main modules. The modules and their functions are defined in this section. The four modules into which the proposed system is divided are

1. Face Detection
2. Image Capture
3. Pre processing
4. Post Processing

Face Detection

A proper and efficient face detection algorithm always enhances the performance of face recognition systems. Various algorithms are proposed for face detection such as Face geometry based methods, Feature Invariant methods, Machine learning based methods. Out of all these methods Viola and Jones proposed a framework which gives a high detection rate and is also fast. Viola-Jones detection algorithm is efficient for real time application as it is fast and robust. [9] Hence we chose Viola-Jones face detection algorithm which makes use of Integral Image and ADAboost learning algorithm as classier. We observed that this algorithm gives better results in different lighting conditions and we combined Haar classifiers to achieve a better detection rates up to an angle of 30 degrees.

Face Detection using Haar-Cascades

A Haar wavelet is a mathematical fiction that produces square-shaped waves with a beginning and an end and used to crate box shaped patterns to recognize signals with sudden transformations. An example is showing in figure 1. By combining several wavelets, a cascade can be created that can identify edges, lines and circles with different colors intensities. These sets are used in Viola Jones face detection technique in 2001 and since then more patterns are introduced for object detection as shown in fig: 1.

To analyses an image using Haar-cascades, a scale is selected smaller than the target image. It is then placed on the image, and the average of the values of pixels in each section is taken. If the difference between two values passes a given threshold, it is considered a match. Face detection on a human face is performed by matching a combination of different Haar-like features. For

examples, forehead, eyebrows and eyes contrast as well as the nose with eyes as shown below in figure.

A single classifier is not accurate enough. Several classifiers are combined as to provide an accurate face detection system as shown in the block diagram below in figure 3.

Here a similar method is used effectively to by identifying faces and eyes in combination resulting better face detection. Similarly, in viola Jones method, several classifies were combined to create stronger classifiers. ADAboost is a machine learning algorithm that tests out several week classifiers on a selected location and choose the most suitable. It can also reverse the direction of the classifier and get better results if necessary.

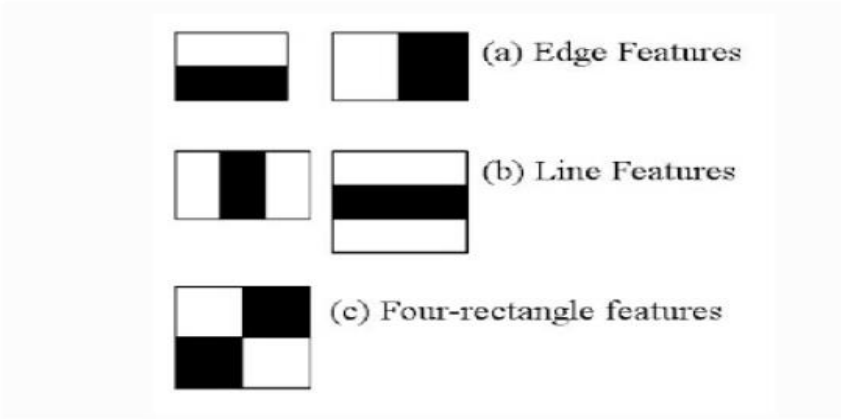


Figure 2: Several Haar-like-features matched to the features of authors face.

Furthermore, Weight-update-steps can be updated only on misses to get better performance. The cascade is scaled by 1.25 and re-iterated in order to find different sized faces. Running the cascade on an image using conventional loops takes a large amount of computing power and time. Viola Jones used a summed area table (an integral image) to compute the matches fast. First developed in 1984, it became popular after 2001 when Viola Jones implemented Haar-cascades for face detection. Using an integral image enables matching features with a single pass over the image.

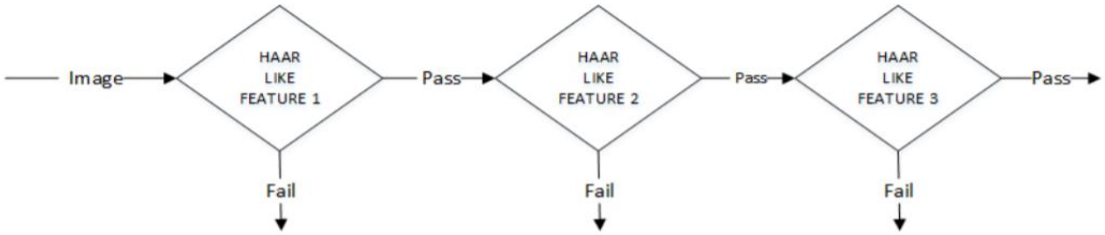


Figure 3: Haar-cascade flow chart

Image Capture

The Camera is mounted at a distance from the entrance to capture the frontal images of the students. And converting captured images into gray scale.

Pre-Processing

The detected face is extracted and subjected to preprocessing. This pre-processing step involves with histogram equalization of the extracted face image and is resized to 100x100. Histogram Equalization is the most common Histogram Normalization technique. This improves the contrast of the image as it stretches the range of the intensities in an image by making it more accurate and creates the dataset and trained images using algorithm for recognition of face.

The preprocessing steps implemented are as follows:

- Conversion of grayscale image
- Image size normalization
- Histogram equalization

Post Processing

In the proposed system after recognizing the faces of the persons, the names are updated into an Excel sheet. The Excel sheet is generated by exporting mechanism present in the database system. The database system also the ability to provide the Name and ID of the person and this data may further use for the purpose of student attendance, a monthly and weekly reports of students' attendance record. These generated records send to parents or guardians of students. At the end of the classes a provision to announce the name of all students who are present in the classes also included. This ensures that students whose faces are recognized by the system have the chance to send a ticket of staff.

3.5 System Design

3.5.1 Data Flow Diagrams

A graphical tool used to describe and analyze the moment of data through a system manual or automated including the process, stores of data, and delays in the system. Data Flow Diagrams are the central tool and the basis from which other components are developed. The transformation of data from input to output, through processes, may be described logically and independently of the physical components associated with the system.

The DFD is also known as a data flow graph or a bubble chart. :

DFD's are of two types

1. Physical DFD

Structured analysis states that the current system should be first understand correctly. The physical DFD is the model of the current system and is used to ensure that the current system has been clearly understood. Physical DFDs shows actual devices, departments, and people etc., involved in the current system.

2. Logical DFD:

Logical DFD s is the model of the proposed system. They clearly should show the requirements on which the new system should be built. Later during design activity this is taken as the basis for drawing the system's structure charts.

3.5.1.1 Flow diagram

The below diagram represents System Architecture of proposed system, where all modules involved through recognition process is represented. The proposed system contains two major phases such as training phase and test phase. Training phase is conducted and pickle file is generated. The proposed recognition system uses OpenCV for image processing and LBPH classifier for face recognition.

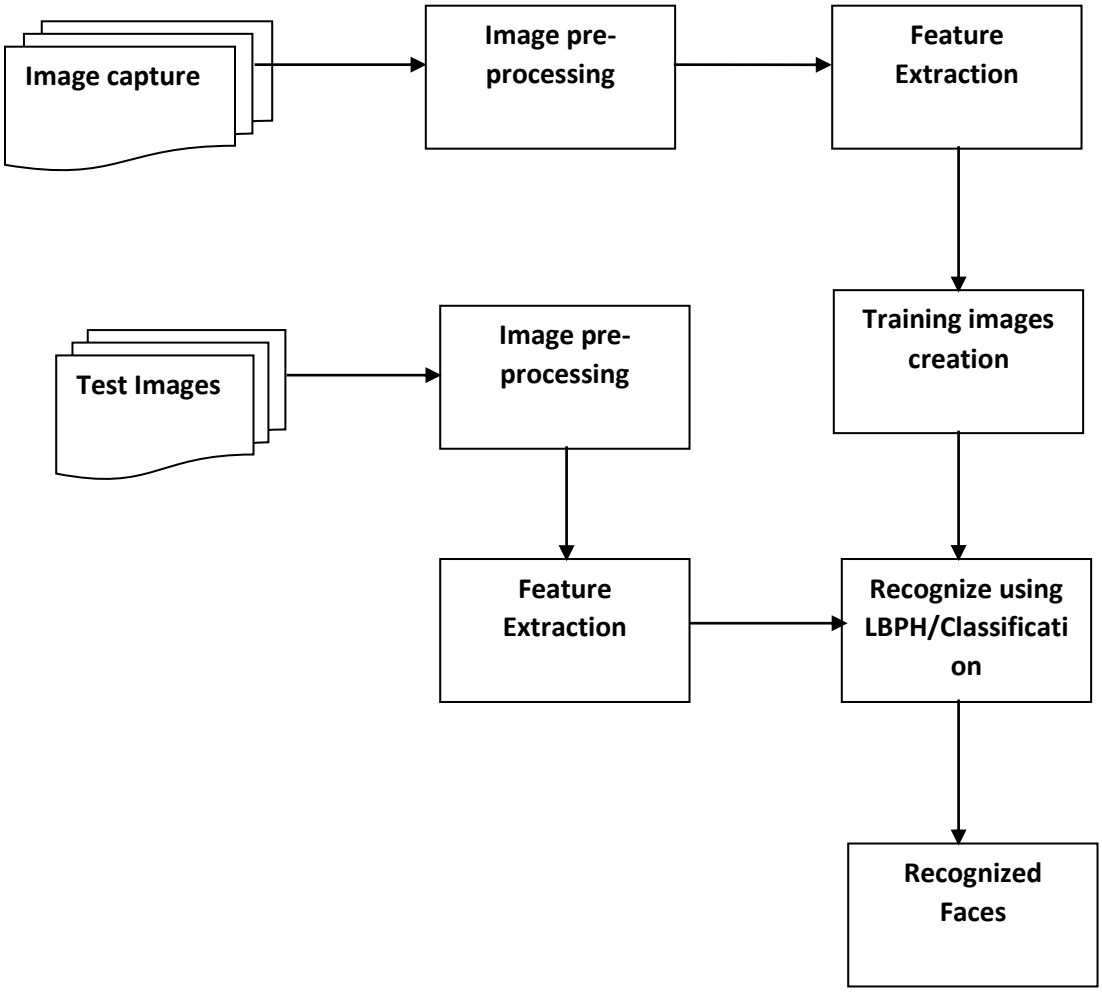


Fig: Architecture of Face recognition system

3.5.2.2 Use case diagram

A Use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The below figure represents use case diagram of the proposed system, in which user train the system, gets output pickle file of trained data. User also uploaded test image, LBPH classifier is applied for recognition.

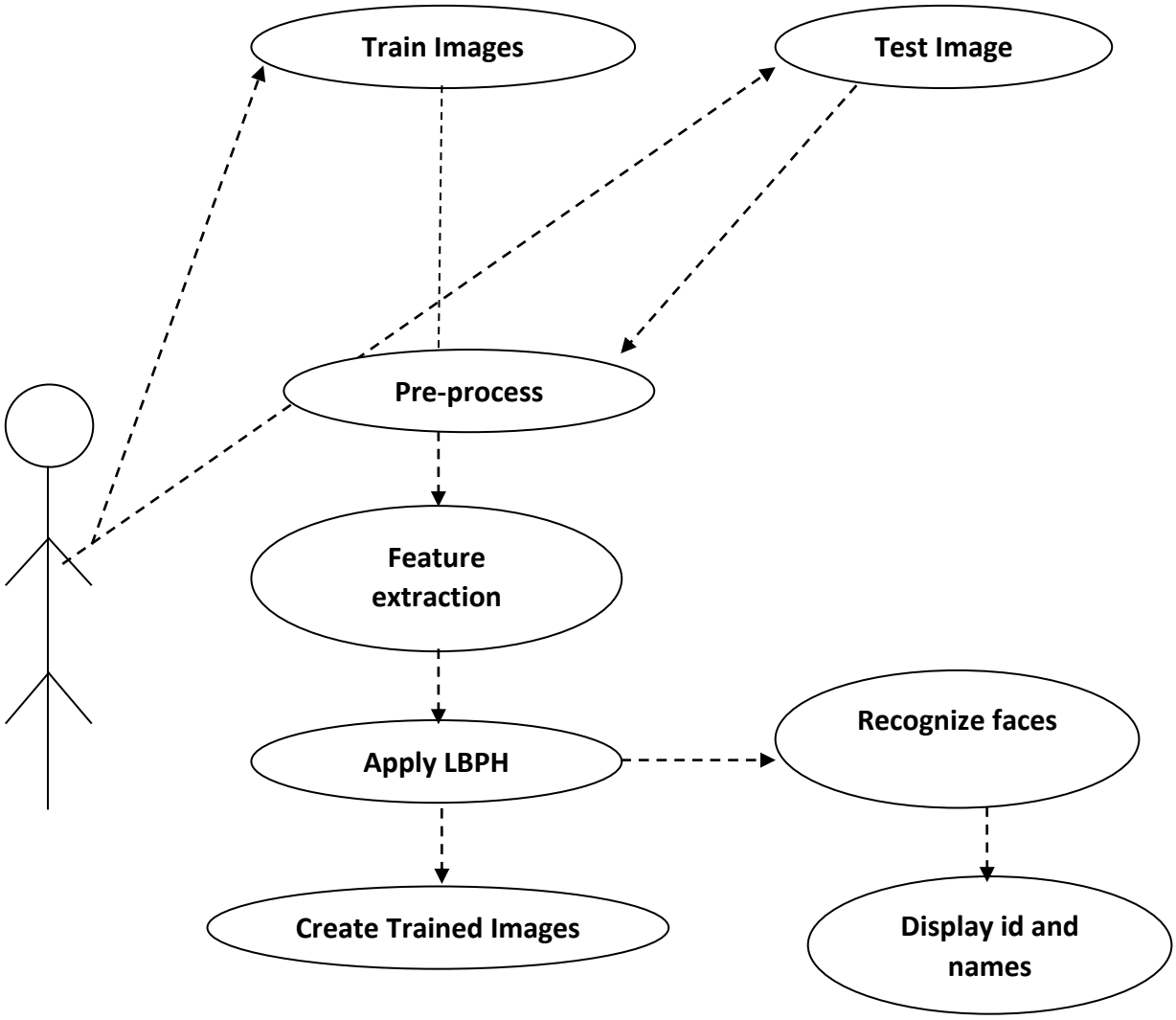


Figure: Use case Diagram

3.6 Software requirements specification

3.6.1 Hardware Requirements:

- Processor – i3 or latest versions
- RAM – 4 GB RAM

3.6.2 Software Requirements:

- Operating system: Windows operating system
- Framework: Python programing (PyCharm/python3.6)
- Tkinter 3.6

3.6.2(a) Python:

Python is a widely used general-purpose, high-level programming language. It was initially designed by Guido van Rossum in 1991 and developed by Python Software Foundation. Python is used for software development at companies and organizations such as Google, Yahoo, CERN, Industrial Light and Magic, and NASA. Python is an interpreter, object-oriented, high-level programming language with dynamic semantics. Python's simple, easy to learn syntax emphasizes readability and therefore reduces the cost of program maintenance. Python supports modules and packages, which encourages program modularity and code reuse. The Python interpreter and the extensive standard library are available in source or binary form without charge for all major platforms, and can be freely distributed.

Since there is no compilation step in python, the edit-test-debug cycle is incredibly fast. Debugging Python programs is easy: a bug or bad input will never cause a segmentation fault. Instead, when the interpreter discovers an error, it raises an exception. When the program doesn't catch the exception, the interpreter prints a stack trace. A source level debugger allows inspection of local and global variables, evaluation of arbitrary expressions, setting breakpoints, stepping through the code a line at a time, and so on. The debugger is written in Python itself, testifying to Python's own power. On the other hand, often the quickest way to debug a program is to add a few print statements to the source the fast edit-test-debug cycle makes this simple approach very effective.

Python is interpreted – Python is processed at runtime by the interpreter. You do not need to compile your program before executing it. This is similar to PERL and PHP.

Python is Object Oriented- Python supports Object-Oriented style or technique of programming that encapsulates codes within objects.

Python is beginners Language—Python is great language for the beginner-level programmers and supports the development of a wide range of applications from simple text processing to WWW browsers to games.

It is used for:

- Web development(server-side)
- Software development
- Mathematics
- System Scripting

Python Programming Language provides some inbuilt function like,

OpenCV: OpenCV was started at Intel in 1999 by Gary Bradsky and the first release came out in 2000. Currently OpenCV supports a wide variety of programming languages like C++, Python, Java etc., and is available on different platform including windows, Linux, Os, android, ios etc., also interface based on CUDA and openCL or also under active development for high speed GPU operations.

OpenCV-Python is the pyton API of OpenCV. It combines the best qualities of OpenCV C++, API and Python language.

OS support: OpenCV runs on following desktop Operating System:

Windows,Linux, macOS, FreeBSD , NetBSD, OpenBSD runs on the following mobile operating system: Android, ios, Maemo, Blackberry10.

Numpy: Numpy is the general purpose array processing package. It provides a high performance multimedia dimensional array object, and tools for working with this array.

It is fundamental package for scientific computing with python. Besides its obvious scientific users, Numpy can also be used as an efficient dimension container of generic data.

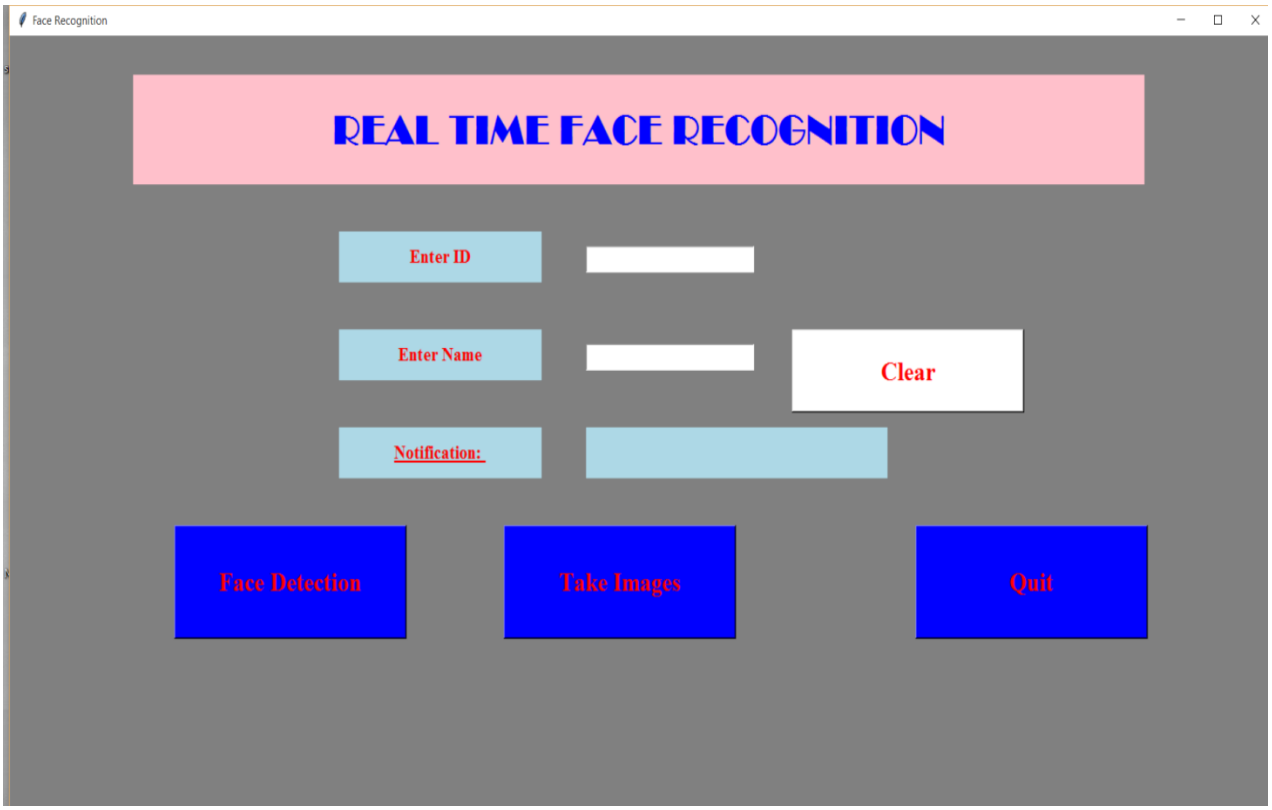
Scikit-learn-machine learning in python: It is a free software machine learning library for the python programming language. Keyword is **Sklearn.**

Its features various classification regression, clustering algorithms including support vector machines, random forests, gradient boosting K-means and DBSCAN, and is designed to interoperate with the python numerical and scientific libraries Numpy and SciPy.

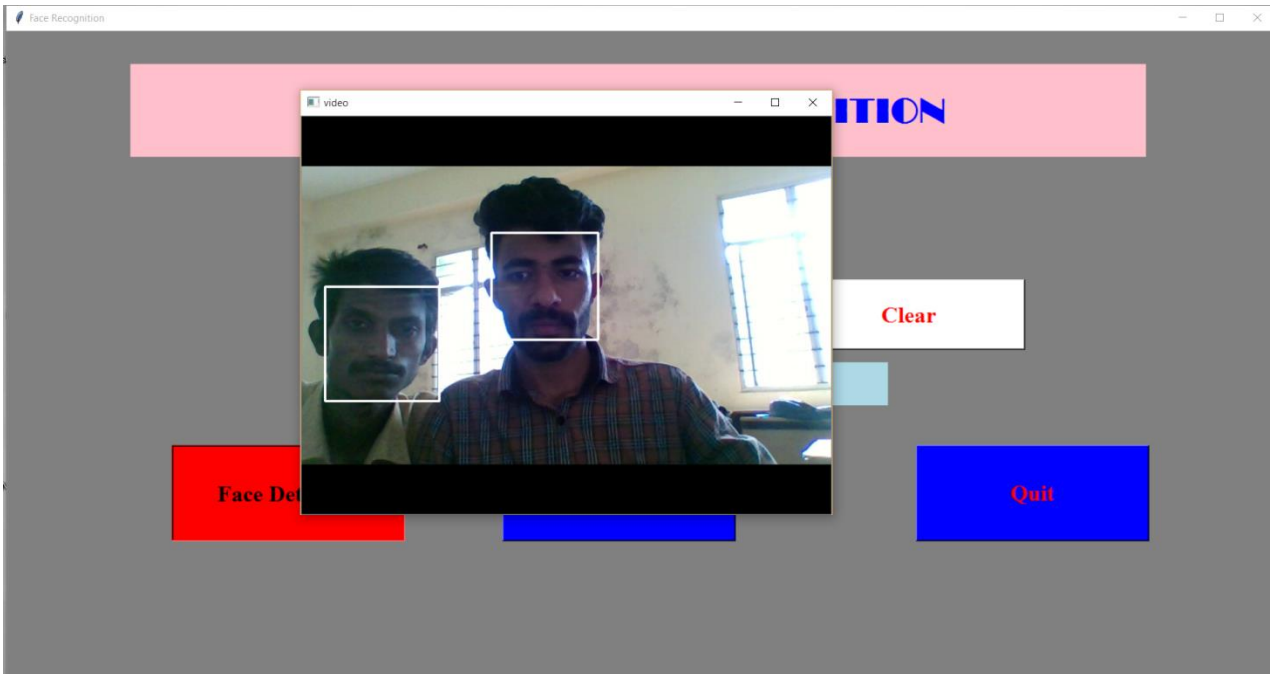
- Simple and efficient tools for data mining and data analysis.
- Accessible to everybody and reusable in various context.
- Built on Numpy and SciPy, and matplotlib
- Open source, commercially usable

RESULTS AND SNAPSHOTS

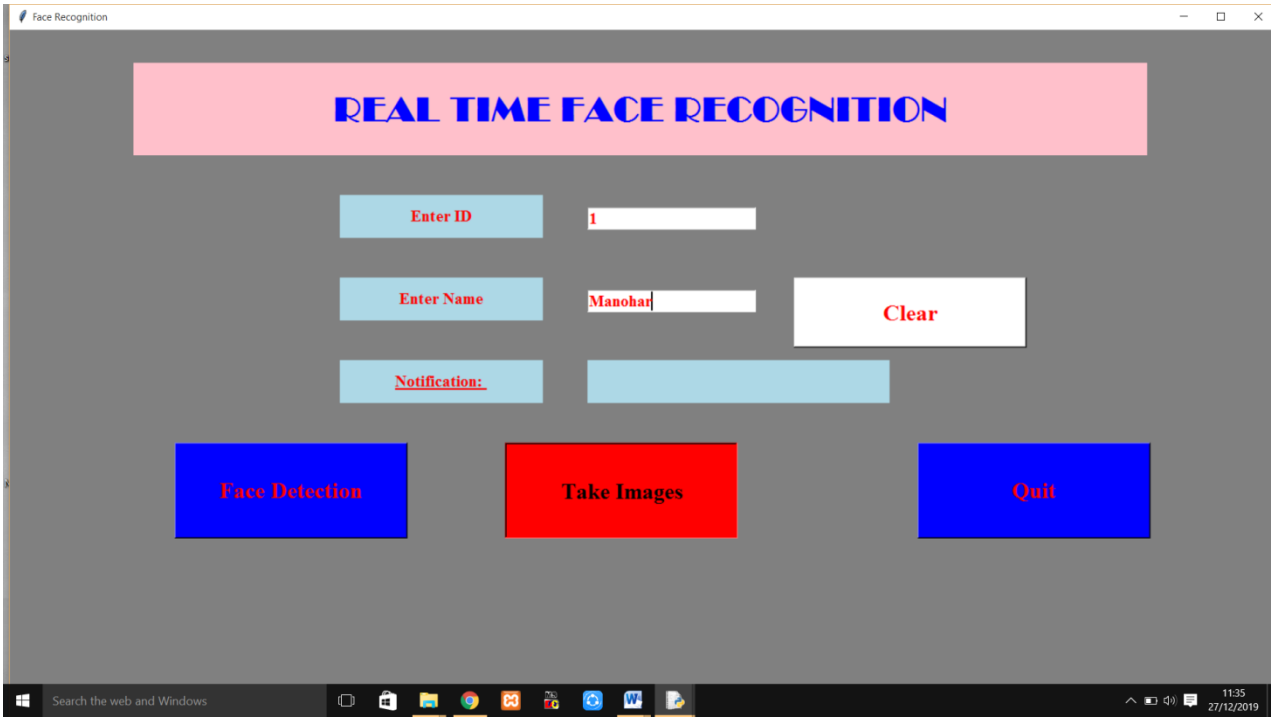
i) Front Page



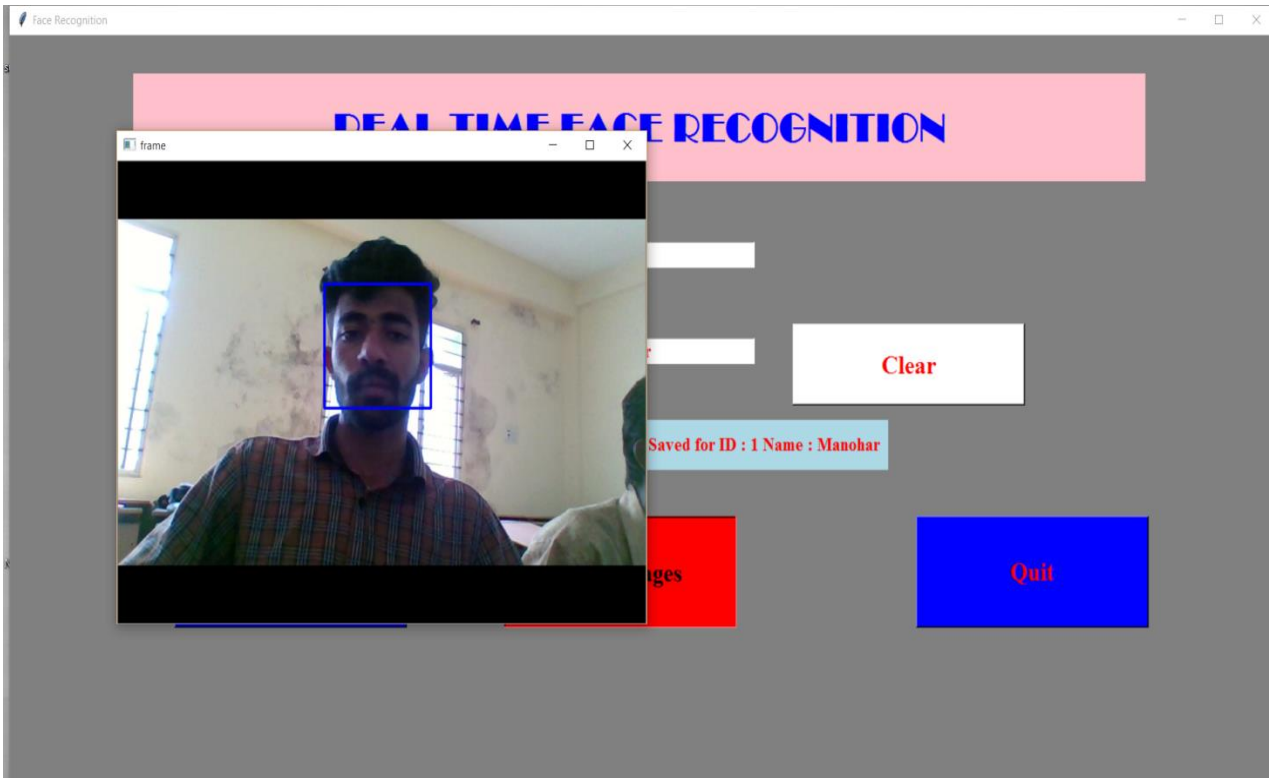
ii) Detecting multiple faces :



iii) Getting User ID and Name



iv) Capturing images from video and converting images to grayscale and save the images with ID and Name



CONCLUSION

The system in this proposal is to recognize human face efficiently, and it can be used for security purposes at bank, stores, institutions, industries and other security organizations. This System can also beneficial to identify the abnormal events and surveillance issues.

Now we are just completing only detecting the multiple faces using Haar Cascade Classifier in a video and then capturing the detected faces in a video and stored those captured images with their names and ID in database.

In the next procedure, using these stored images we can train these images using LBP algorithm recognizes the persons face.

FUTURE WORK ENHANCEMENT

The future work needs efficient segmentation method that can segment each face without any overlapping or missing parts. Using algorithm we have to recognize the faces accurately.

With the help of stored images extracting the features of images and then create the dataset of trained images. These trained images are helps to recognize the faces in real time camera.

Extracting the features of new detected faces, then comparing the new detected with the already stored dataset or trained dataset with the help of algorithm we can recognize the faces with their names and ID.

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