NEW HORIZON COLLEGE OF ENGINEERING

New Horizon Knowledge Park, Ring Road, Marathalli

Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC

Accredited by NAAC with 'A' Grade, Accredited by NBA

"FACE RECOGNITION USING MATLAB"

A MINI PROJECT

REPORT

Submitted by

A HEMANTH REDDY	(1NH18EC701)
B SAI RATHAN TEJA	(1NH18EC707)
B BHARATH SAI	(1NH18EC129)
SANTHOSH H M	(1NH18EC745)

In partial fulfillment for the award of the degree of

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IN

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

CERTIFICATE

Certified that the mini project work entitled "**Ultrasonic Distance Measurement**" carried out by, **A Hemanth Reddy(1NH18EC701), B Rathan Teja(1NH18EC707), B Bharath Sai(1NH18EC129), Santhosh H M(1NH18EC745)** bonafide students of Electronics and Communication Department, New Horizon College of Engineering, Bangalore.

The mini project report has been approved as it satisfies the academic requirements in respect of mini project work prescribed for the said degree.

Project Guide   HOD ECE

(Ms. Tessy Tomy)   (Dr. Sanjeev Sharma)

------------------------   ------------------------

External Viva

Name of Examiner   Signature with Date

1.

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ABSTRACT

Face is one of the easiest ways to distinguish the identity of the individual people. Face recognition is the identification system that uses face characteristics of a person to know their identity. Face recognition mainly consists of two steps Training process and Testing process were both the process requires feature extraction. Feature extraction plays a main role for the high accuracy of the output. There are many ways for the feature extraction mainly eigen features, HOG features and some statistical features. In the training process many inputs images/faces are given to extract the features and store them. In the testing process the image/face which has to be identified is processed to extract the features. The extracted featured are compared to find the unidentified face. The software required for this project is MATLAB. MATLAB is a matrix-based system for the calculation of scientific and engineering computation.

ACKNOWLEDGEMENT

The satisfaction that accompany the successful completion of any task would be, but impossible without the mention of the people who made it possible, whose constant guidance and encouragement helped us succeed.

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A Hemanth Reddy   (1NH18EC701)

B Sai Rathan Teja   (1NH18EC707)

B Bharath Sai   (1NH18EC129)

Santhosh H M   (1NH18EC745)

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CHAPTER 01

INTRODUCTION

Personal Computer vision offers a high requesting application and results explicitly face location and recognition. This region has consistently become the specialists' significant concentration in picture investigation on account of its tendency as human-face essential ID strategy. It is extremely intriguing and turns out to be such a test to show a machine to carry out this responsibility. Face recognition likewise is one of the most troublesome issues in PC vision zone. Face discovery and recognition likewise gets an enormous consideration in clinical field and research networks including biometric, design recognition and PC vision networks.

Face recognition frameworks are a piece of facial picture handling applications and their importance as an examination territory are expanding as of late. They use biometric data of people and are pertinent effectively rather than unique mark, iris, signature and so on., in light of the fact that these sorts of biometrics are very little reasonable for non-community-oriented individuals. Face recognition frameworks are generally applied and favored for individuals and surveillance cameras in metropolitan life.

The field of biometrics innovation uses identification and recognition strategy including human body parts, for example, unique mark, palm, retina (eyes) and face. Biometrics ID strategy for get to isn't just confirming yet additionally checks the character of an individual, which is relating to the approved access. As far as unwavering quality and security of access, biometrics offers a superior one as opposed to the traditional access technique which utilizing the secret phrase. The secret key access strategy just verifies the client yet doesn't really "know" the client. Others can without much of a stretch take or hack another person's secret key. At the point when this occurs, the individual who took the secret key might have the option to sign into the made sure about framework and access others' information that is close to home and significant. The raising of PC capacities and the market interest for security has likewise determined the investigations of face identification and recognition into a more profound profundity.

Biometrics ID strategy, for example, physiological technique (face, unique finger impression, eyes) is more equipped and stable than the conduct strategy (keystrokes, voice). Physiological technique is increasingly steady on the grounds that the component, for example, face isn't handily changed except if extreme harm happened to the face. Rather than conduct strategy, for example, voice print that may change effectively due specific reasons like wellbeing factor, ailment stress. Biometrics qualities are hard to emulate and, in this manner, it is exceptionally difficult to fashion. This might be the one the reasons of why face recognition is notable for its usefulness.

A facial recognition gadget is one that sees a picture or video of an individual and looks at it to one that is in the database. It does this by looking at structure, shape and extents of the face; separation between the eyes, nose, mouth and jaw; upper frameworks of the eye attachments; the sides of the mouth; area of the nose and eyes; and the zone encompassing the check bones.

Upon enrollment in a facial recognition program, a few pictures are taken of the subject at various edges and with various outward appearances. At time of check and distinguishing proof the subject stands before the camera for a couple of moments, and afterward the picture is contrasted with those that have been recently recorded. A facial recognition framework is a PC application for naturally recognizing or confirming an individual from a computerized picture or a video outline from a video source. One of the approaches to do this is by contrasting chosen facial highlights from the picture and a facial database.

CHAPTER 02

LITERATURE REVIEW

Paper -1

TITLE: Face recognition system using image processing

AUTHOR: Jawad Nagi

YEAR OF PUBLICATION: 2013

OUTCOME: Since skin in color varies by individual, research has revealed that increasingly rather is the main characteristic. The recognition stage typically uses a representation of the image by the 2D-DCT for further processing.

LIMITATIONS: When a face detection algorithm finds a face in an image or in a still form an image or in a still from a video capture. The size of the testing image differs as compared to enrolled image, so go further.

Paper -2

TITLE: Privacy preserving Face recognition

AUTHOR: Martin Franz

YEAR OF PUBLICATION: 2011

OUTCOME: Face recognition is increasingly deployed as a mean to unobtrusively verify the identity of people. Now a days mostly in electronic devices such as phones, laptops etc. We are using face recognition as a security password instead of using drawing pattern are using pin. Here basically the device will ask a operator to scan of his/her face it will store in a database. Now when the operator wants to operate the device it will scan the face and then compare with the face which is already present In database later it will access.

LIMITATIONS: Technologies indiscriminate and largescale recording, storing and analyzing of our images undermines. Because it means we can no longer do anything in public without state knowing about it.

Paper-3

TITLE: Face recognition by support vector machines

AUTHOR: Thomas Toft

YEAR OF PUBLICATION :2013

OUTCOME: Support Vector Machines have been proposed by Vapik and his Co-workers as a very effective method for general purpose recognition. Given a set of points belonging to two class, a SVM finds the hyperplane that separates the large possible maximizing the distance either class to the hyperplane.

LIMITATIONS: Target classes are overlapping. The number of features of testing image is more as compared to trained faces. Feature Extraction does not give proper results.

Paper-4

TITLE: Face recognition based on monitoring of attendance

AUTHOR: Robert Mauro

YEAR OF PUBLICATION: 2012

OUTCOME: Conducted a monitoring of attendance using a network by collecting the data on a face recognition. When the people who came for attendance the face will be compared with a other face which is already present in the database. Now it will record the attendance and sent a message to the student of parents regarding their attendance.

LIMITATIONS: It becomes very time consuming and a cumbersome process as each and every people who came for attendance has to wait for their turn in queue in order to give their attendance.

Paper-5

TITLE: Infrared Recognition

AUTHOR: Reza Shoja Ghiass

YEAR OF PUBLICATION: 2014

OUTCOME: In the last two decades AFR has consistently been one of the most active research area of computer vision and applied pattern recognition. Recognition of images based on the visible spectrum has reached the higher level of security with practical success.

LIMITATIONS: The drawback of using the infrared spectrum for face recognition is that glass and thus eyeglasses are opaque to wavelengths longer and including the SWIR sub band.

Paper-6

TITLE: Real Time face recognition attendance system using MAT lab.

AUTHOR: Pvn and gupta

YEAR OF PUBLICATION: 2014

OUTCOME: Here it will use any USB Web camera or laptop web can attached with your computer. This GUI based application automatic identifies a face and matches it with the data base created.

LIMITATIONS: Different face angles of the targets face influences the recognition score profoundly. The pose which we gave before should be same as when we are giving attendance if the angle of pose differs then the attendance won't be accepted.

CHAPTER 03

EXISTING SYSTEM AND PROBLEM STATEMENT

Throughout the most recent couple of decades numerous strategies have been proposed for face recognition. Huge numbers of the strategies proposed during the beginning periods of PC vision can't be viewed as effective, yet practically the entirety of the ongoing ways to deal with the face recognition issue have been noteworthy. As indicated by the exploration by Brunelli and Poggio (1993) all ways to deal with human face recognition can be separated into two techniques:

(1) Geometrical features

(2) Template matching.

1.Face recognition using Geometrical Features

This method includes calculation of a lot of geometrical features, for example, nose width and length, mouth position and jaw shape, and so forth from the image of the face we need to perceive. This arrangement of features is then coordinated with the features of known people. A reasonable metric, for example, Euclidean separation (finding the nearest vector) can be utilized to locate the nearest coordinate.
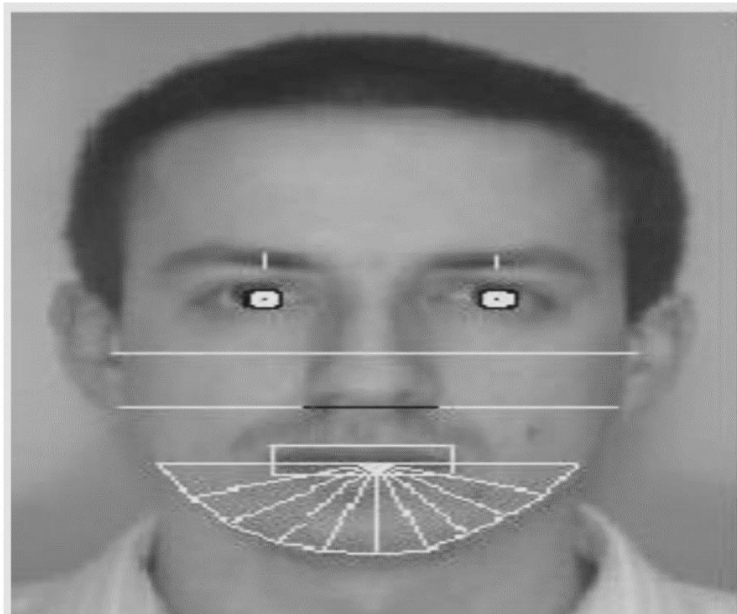

Figure 3.1 Geometrical features

In the above figure the geometrical features that are in white are used for facial recognition.

The upside of utilizing geometrical features as a reason for face recognition is that recognition is conceivable even at extremely low goals and with uproarious (pictures with numerous scattered pixel powers). Despite the fact that the face can't be seen in detail its general geometrical setup can be separated for face recognition. The procedure's fundamental burden is that mechanized extraction of the facial geometrical features is extremely hard. Robotized geometrical component extraction-based recognition is likewise exceptionally delicate to the scaling and revolution of a face in the picture plane (Brunelli and Poggio, 199). This is clear when we look at Kanade's(1973) results where he revealed a recognition pace of between 45-75 % with a database of just 20 individuals. Be that as it may, if these features are extricated physically as in Goldstein et al. (1971), and Kaya and Kobayashi (1972) good outcomes might be gotten.

2.Face recognition using template matching

This is comparative the template matching procedure utilized in face recognition, aside from here we are doing whatever it takes not to order a picture as a 'face' or 'non-face' however are attempting to perceive a face.

Figure 3.2 Face recognition using template matching

Entire face, eyes, nose and mouth locales which could be utilized in a template matching methodology. The premise of the template matching technique is to separate entire facial locales (grid of pixels) and contrast these and the put away pictures of known people. Indeed Euclidean separation can be utilized to locate the nearest coordinate. The straightforward strategy of looking at dark scale power esteems for face recognition was utilized by Baron (1981). Anyway there are undeniably increasingly advanced techniques for template matching for face recognition. These include broad pre-preparing and change of the separated dark level force esteems. For instance, Turk and Pentland (1991a) utilized Principal Component Analysis, once in a while known as the eigenfaces approach, to pre-process the dim levels and Wiskott et al. (1997) utilized Elastic Graphs encoded utilizing Gabor channels to pre-process the extricated districts. An examination of geometrical features versus template matching for face recognition by Brunelli and Poggio (1993) arrived at the determination that albeit an element-based procedure may offer higher recognition speed and littler memory necessities, template-based methods offer prevalent recognition exactness

A manual face recognition framework was acknowledged by estimating the facial extents of the normal face, determined from 30 guineas pigs. To recognize a face, a human administrator would distinguish the areas of the subject's eyes in a picture and utilizing the extents of the normal face, the framework would portion a zone from the picture

A template matching based strategy was actualized for face recognition. This was a result of its expanded recognition precision when contrasted with geometrical features-based procedures and the way that a computerized geometrical features-based strategy would have required complex element location pre-preparing.

Problem Statement is

1.Presence of auxiliary parts

- There might be another extra parts on the face, for example, displays, moustache or whiskers.
- These parts may have various sorts, shapes, hues and surfaces.

2. Outward appearance

- The outward appearance takes after straightforwardly on the individual's face.

3. Impediment

- A face might be in part hindered by another person or something when the picture is caught among swarms.

4. Picture direction

- It includes with the variety in pivot of the camera's optical hub.

5. Imaging condition

- The state of a picture relies upon the lighting and camera attributes.

There are different difficulties (which are not talked about in this report) in face identification and recognition however these are the broadest issues.

CHAPTER 04

PROPOSED SYSTEM

In this project there are mainly two process

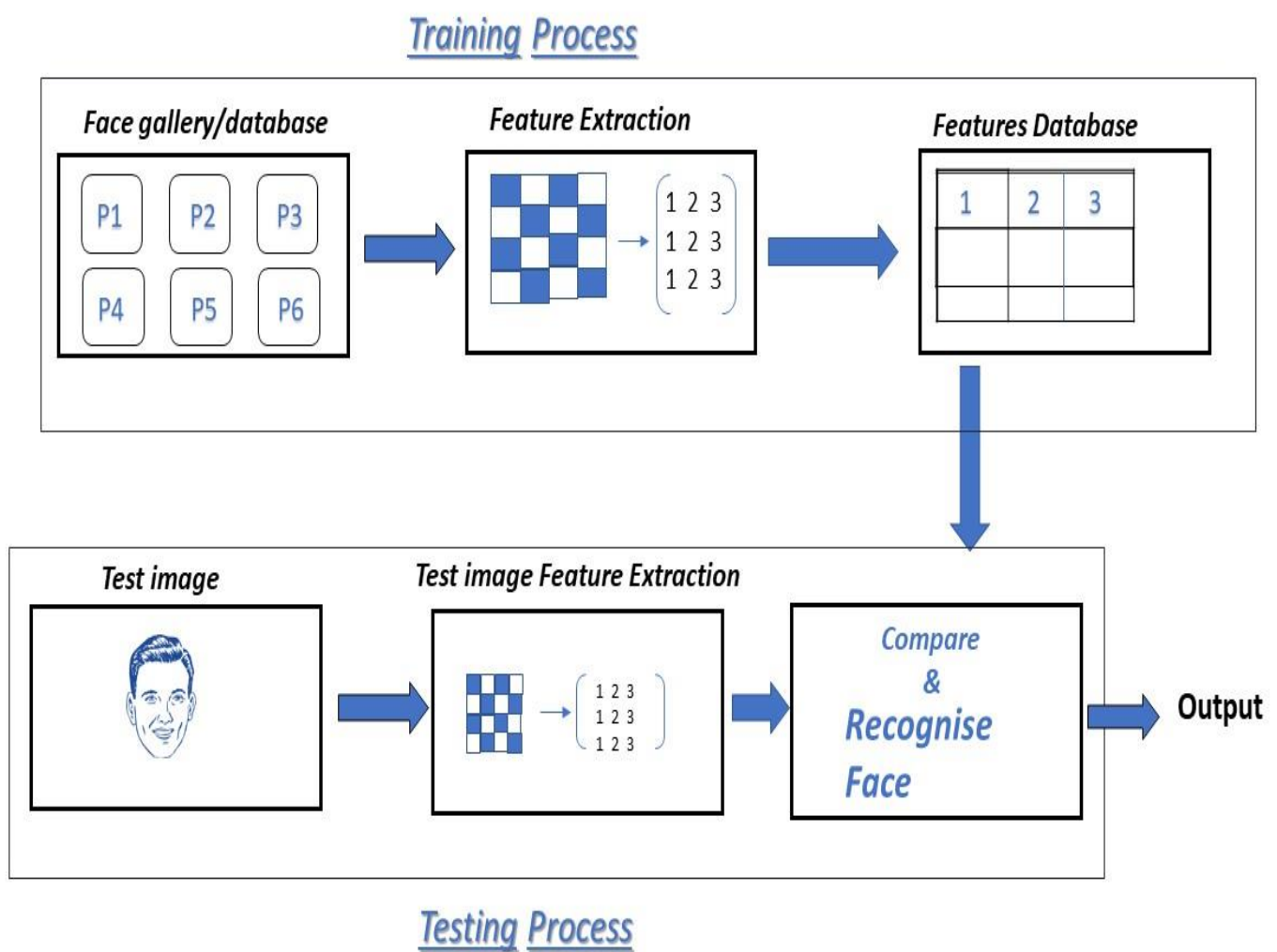1. Training Process

2. Testing Process

Figure 4.1 Block Diagram

1.Training Process

The set of images (5 images) of each person is saved in the respective folders. Then all the images are loaded to the MATLAB. The next step is feature extraction. Feature extraction a kind of dimensionality decrease that proficiently speaks to intriguing pieces of a picture as a smaller feature vector. This methodology is helpful when picture sizes are huge and a diminished feature portrayal is required to rapidly finish errands, for example, picture matching and recovery.

The types of feature extractions are

- Histogram of oriented gradients (HOG)

- Speeded-up robust features (SURF)

- Local binary patterns (LBP)

- Haar wavelets

- Colour histograms

For our projects we used HOG feature extraction. The histogram of arranged angles (HOG) is a component descriptor utilized in computer vision and picture handling with the end goal of item location. The method includes events of inclination direction in limited segments of a picture. This strategy is like that of edge direction histograms, scale-invariant component change descriptors, and shape settings, yet varies in that it is figured on a thick lattice of consistently divided cells and utilizations covering nearby complexity standardization for improved precision.

The next step is to classify according to pre-defined model. The model is created from the face database where database should contain the faces of students in the a particular folder where the images in the database go for the feature extraction and then the feature extraction will go for the learning model hear we used "**Support Vector Machine**" as a learning model, "Support Vector Machine" (SVM) is a supervised machine learning algorithm which can be used utilized for both classification or regression challenges. In any case, it is for the most part utilized in characterization issues. In the SVM calculation, we plot every datum thing as a point in n-dimensional space with the estimation of each feature being the estimation of a specific facilitate.

SVM is a discriminant method, and, on the grounds that it takes care of the arched improvement issue systematically, it generally restores the equivalent ideal hyperplane parameter—as

opposed to hereditary calculations (GAs) or perceptron's, the two of which are broadly utilized for order in AI. For perceptron's, arrangements are exceptionally subject to the instatement and end rules. For a particular piece that changes the information from the info space to the feature space, preparing returns extraordinarily characterized SVM model parameters for a given preparing set, while the perceptron and GA classifier models are distinctive each time preparing is instated. The point of GAs and perceptron's is just to limit blunder during preparing, which will convert into a few hyperplanes' gathering this necessity.
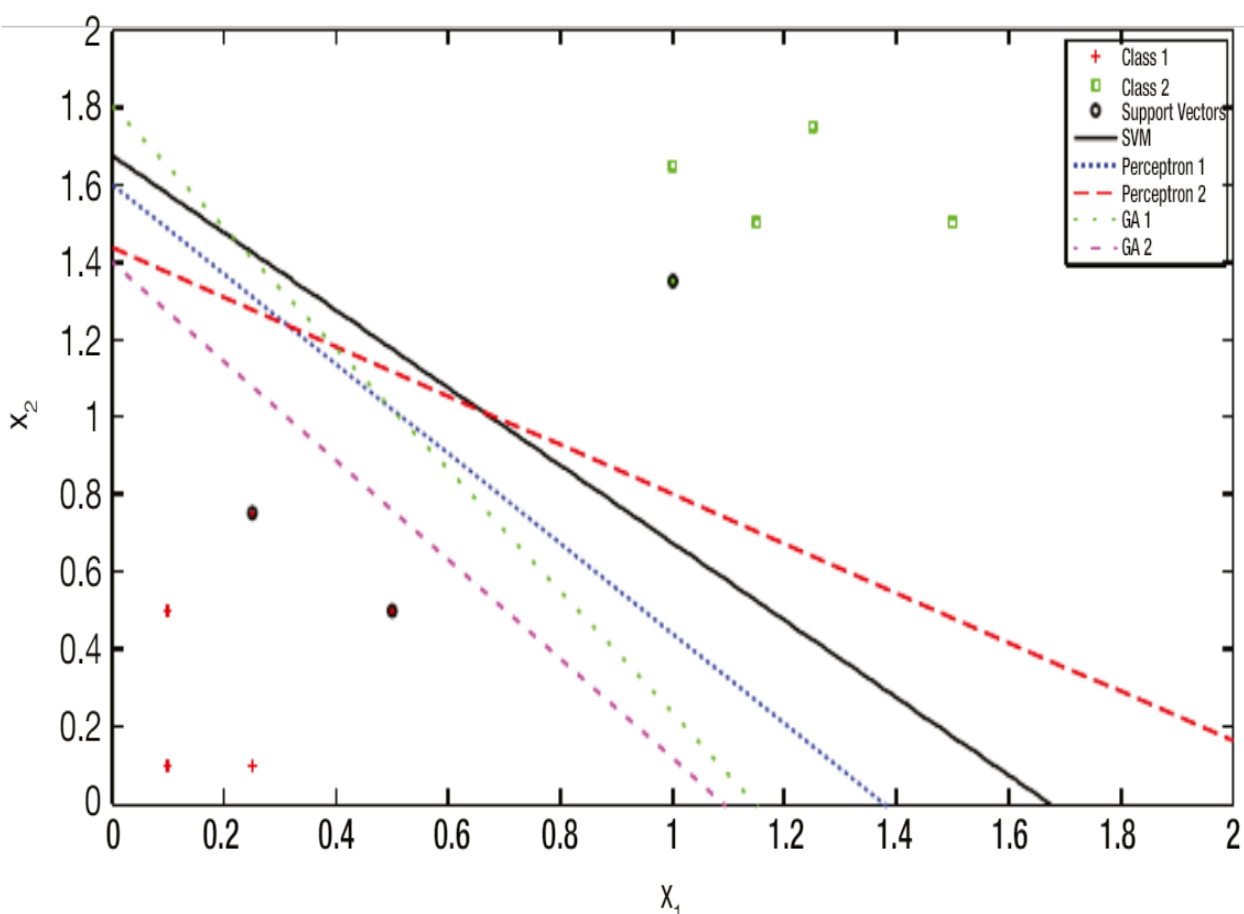

Figure 4.2 Two-dimensional, two-class plot for SVM

On the off chance that numerous hyperplanes can be mastered during the preparation stage, just the ideal one is held, in light of the fact that preparation is for all intents and purposes performed on tests of the populace despite the fact that the test information may not display a similar conveyance as the preparation set. At the point when prepared with information that are not agent of the general information populace, hyperplanes are inclined to poor speculation.
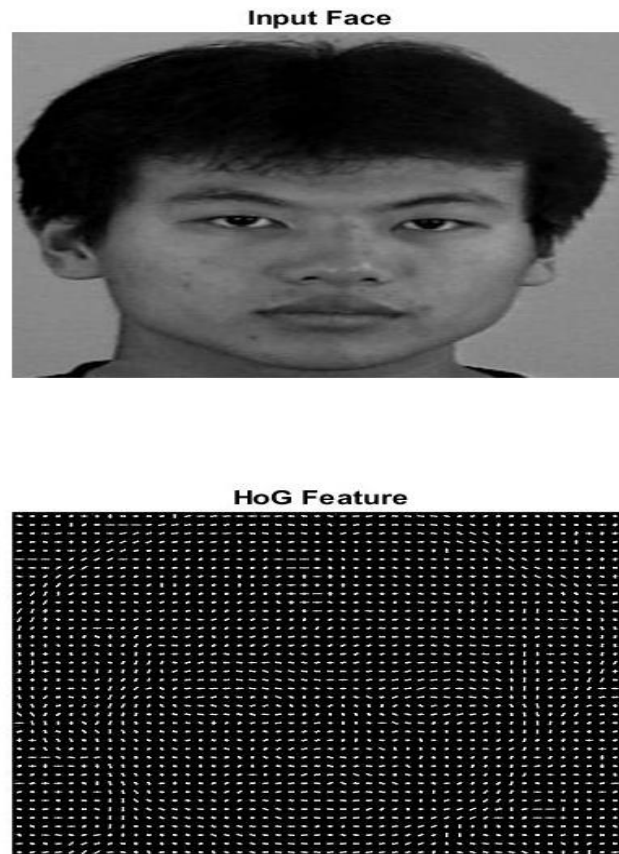
2.Testing Process

Figure 4.3 HOG feature of person

In the testing process the input image is selected. Then the feature is extracted. The extracted feature is compared with the previous data. If the image is available in the database then it shows the result image.

In both the process the images should be given from the computer database only. If any other image is given it will not proceed.

GUI interface

GUI stands for Graphical user Interface. MATLAB has its own GUI which can be interfaced with the code for a better presentation.

Figure 4.4 Snapshot Graphical user interface

In the above shown figure if we click on the 'click to start' button the program starts running. After that it asks for the face for testing. Then a window po up for selecting the face. After the face is selected it compares and gives the results by presenting the query image and Matched image side by side.

CHAPTER 05

SOFTWARE SPECIFICATIONS

MATLAB

The name MATLAB represents network research center. MATLAB was composed initially to give simple access to grid programming created by the LINPACK (direct framework bundle) and EISPACK (Eigen framework bundle) ventures. MATLAB is a superior language for specialized figuring. It coordinates calculation, perception, and programming condition. MATLAB has numerous points of interest contrasted with ordinary programming languages for tackling specialized issues. MATLAB information component is an exhibit that doesn't require dimension. Explicit applications are gathered in bundles alluded to as tool stash. There is tool stash for signal handling, emblematic calculation, control hypothesis, reproduction, improvement, and a few different fields of applied science and building.

MATLAB's POWER OF COMPUTAIONAL MATHMATICS

MATLAB is utilized in each feature of computational arithmetic. Following are some usually utilized numerical figuring where it is utilized most normally:

   I.   Integration
  II.   Statistics
 III.   Transforms
  IV.   Non-linear Functions
   V.   Dealing with Matrices and Arrays
  VI.   Various other special functions
 VII.   Curve Fitting
VIII.   2-D and 3-D Plotting and graphics
  IX.   Linear Algebra
   X.   Algebraic Equations
  XI.   Data Analysis
 XII.   Calculus and Differential Equations Numerical Calculations

FEATURES OF MATLAB

Following are features of MATLAB

i.   It is an elevated level language for numerical calculation, perception and application advancement.

ii.   It likewise gives an intuitive situation to iterative investigation, structure and critical thinking.

iii. It gives immense library of scientific capacities for straight variable-based math, insights, Fourier examination, sifting, enhancement, numerical incorporation and tackling customary differential conditions.

iv.   It gives worked in designs to imagining information and instruments for making custom plots.

v.   MATLAB's customizing interface gives improvement instruments for improving code quality, practicality, and augmenting execution.

vi.   It gives instruments to building applications with custom graphical interfaces.

vii. It is coordinating with other applications for example, C, Java, .NET and Microsoft Excel to get compute in a better way.

USES OF MATLAB

MATLAB is generally utilized as a computational instrument in science and building incorporating the fields of material science, science, math and all designing streams. It is utilized in a scope of utilizations including:

i.   Image and video Processing.

ii.   Signal processing and Communications.

iii. Test and measurement.

iv.   Computational finance.

v.   Control systems.

vi.   Computational biology.

UNDERTSANDING THE MATLAB ENVIRONMENT

The main window in MATLAB is called as the desktop. When MATLAB is started, the desktop appears as a default layout
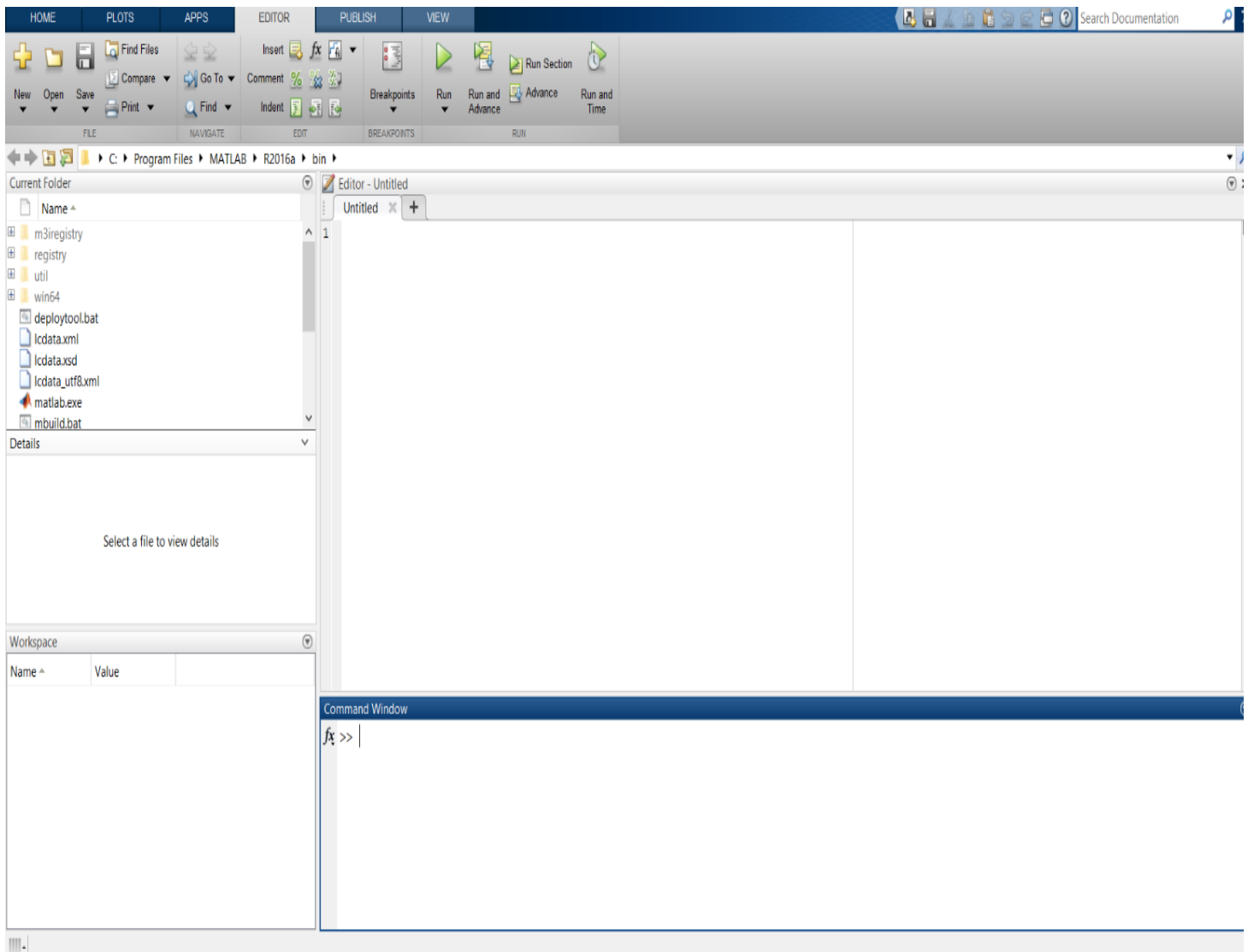

Figure 5.1 MATLAB desktop environment

The desktop has the following panels:

Current Folder - This panel helps to find the current location of the files to be saved.
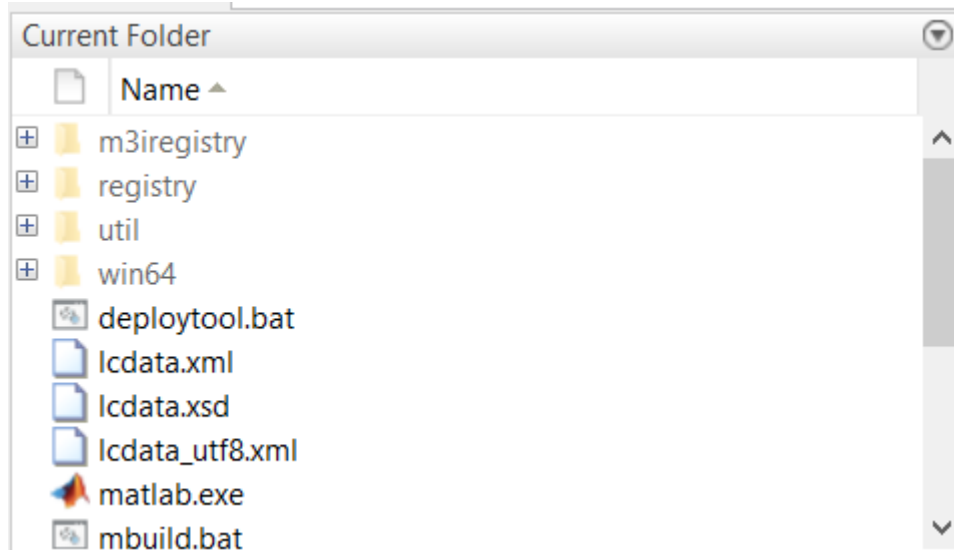

Figure 5.2 Current Folder

Command Window - This is the main panel where commands can be entered to get specified results. It is indicated by the command symbol. (>>).
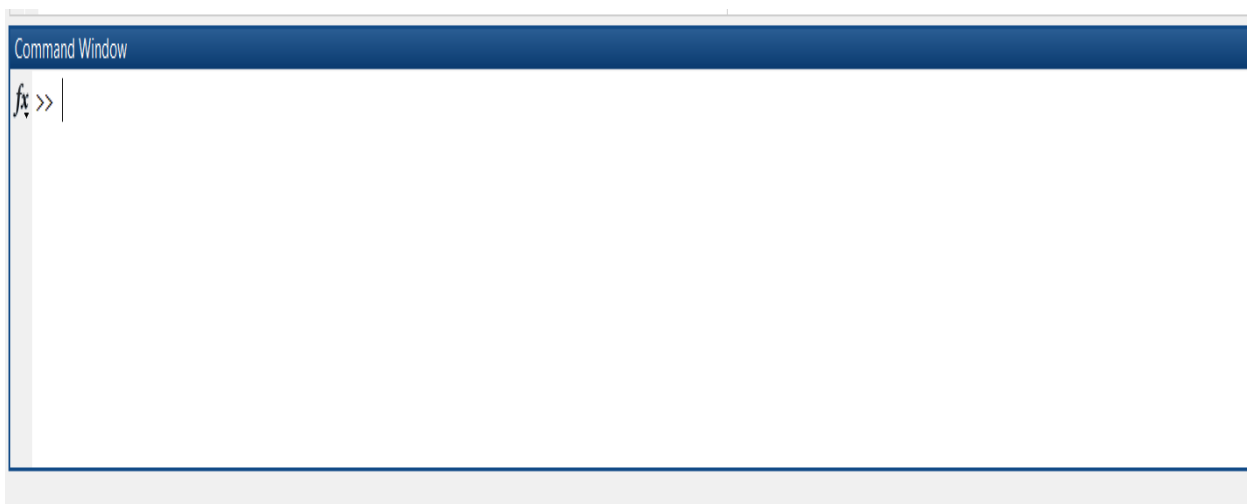

Figure 5.3 Command Window

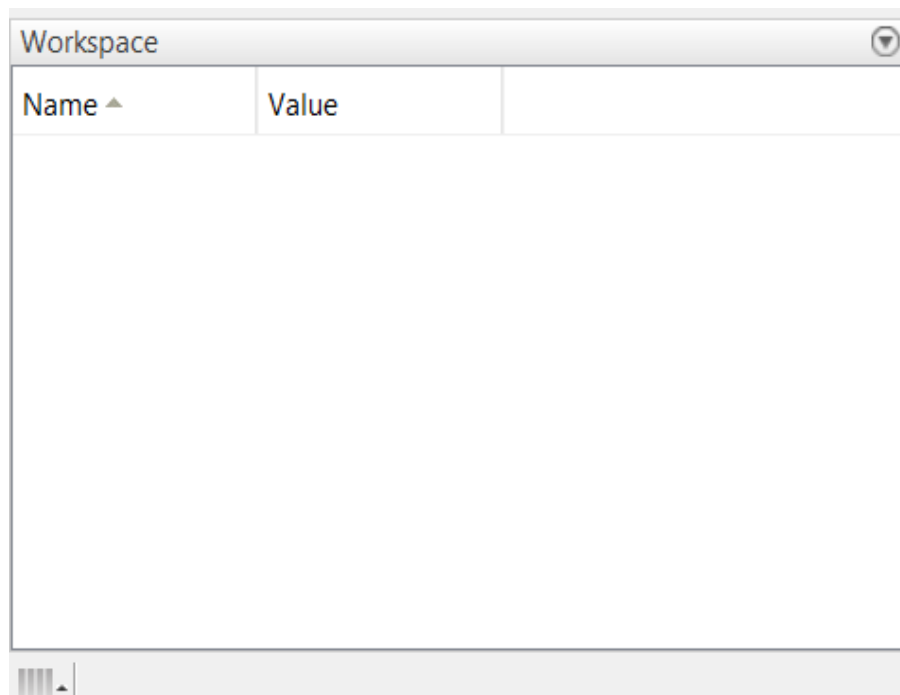**Workspace** - The workspace panel shows all the variables which are created and added from the other files.

Figure 5.4 Workspace

Command History - This panel shows the commands which are entered before the current command.
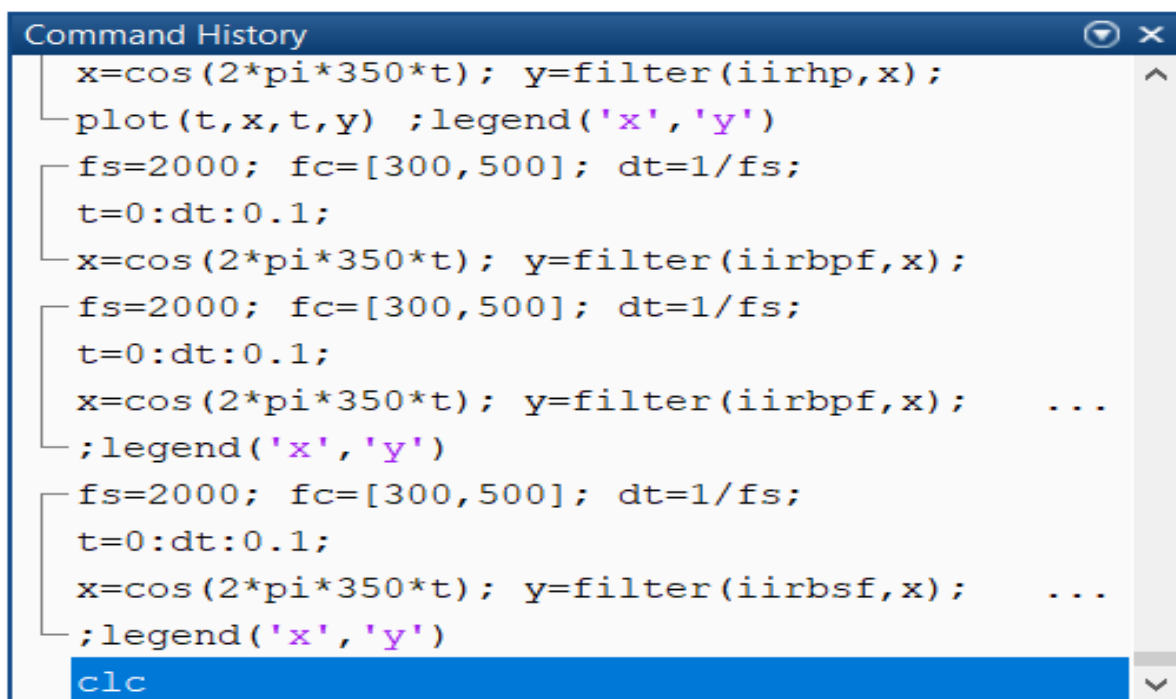
Figure 5.5 Command History

COMMONLY USED OPERATORS AND SPATIAL CHARATERS

MATLAB has the following mainly used operators and special characters:

Operator	Purpose
+	Plus; addition operator.
-	Minus, subtraction operator.
*	Scalar and matrix multiplication operator.
.*	Array and multiplication operator.
^	Scalar and matrix exponentiation operator.
.^	Array exponentiation operator.
\	Left-division operator.
/	Right-division operator.
.\	Array left-division operator.
./	Array right-division operator.

Table 5.1 MATLAB used operators and special characters

COMMANDS

We can enter a command in the Command Window after the MATLAB prompt '>>'.

Command for managing a session

MATLAB provides various commands for managing a program. The following table provides all the commands.

Command	Purpose
Clc	Clear command window
Clear	Removes variables from memory
Exist	Checks for existence of file or variable.
Global	Declare variables to be global.
Help	Searches for help topics.
Look for	Searches help entries for a keyword.
Quit	Stops MATLAB.
Who	Lists current variable.
Whos	Lists current variables (Long Display).

Table 5.2 Commands for managing a session

INPUT AND OUTPUT COMMAND

The input and output commands of the MATLAB are as follows

Command	Purpose
Disp	Displays content for an array or string.
Fscanf	Read formatted data from a file.
Format	Control screen-display format.
Fprintf	Performs formatted write to screen or a file.
Input	Displays prompts and waits for input.
;	Suppresses screen printing.

Table 5.3 Input and output commands

M FILES

MATLAB allows writing the two types of program files:

Scripts:

Script files are program files with .m extension. In these files, we can write series of commands, which we wanted to execute parallelly. Scripts doesn't accept inputs and doesn't give any of the outputs. They operate on data provided in the workspace.

Functions:

Functions files are the program files with .m extension. Functions can accept both the inputs and return outputs also. Internal variables are local to the function.

Creating and Running Script File:

To create scripts files, we needed to use a text editor. We can open the MATLAB editor in two ways as given below:

- ➢ Using the command prompt
- ➢ Using the IDE

DATA TYPES AVAILABLE IN MATLAB

Every data type stores data that is given as input in the form of a matrix or array. The size of the matrix or array is a minimum of 0-to-0. It can be increased up to a matrix or array of any size. MATLAB provides 15 fundamental data types.

The following table is the commonly used data types in MATLAB:

Datatype	Description
Int8	8-bit signed integer
Unit8	8-bit unsigned integer
Int16	16-bit signed integer
Unit16	16-bit unsigned integer
Int32	32-bit signed integer
unit32	32-bit unsigned integer
Int64	64-bit signed integer
Unit64	64-bit unsigned integer
Single	Single precision numerical data
Double	Double precision numerical data
Logical	Logical variables are 1 or 0 represent true &false respectively
Char	Character data (strings are stored as vector of characters)
Call array	Array of indexed calls, each capable of storing array of a different dimension and datatype
Structure	C-like structure each structure having named fields capable of storing an array of a different dimension and datatype

Function handle	Pointer to a function
User classes	Object constructed from a user defined class
Java classes	Object constructed from a java class

Table 5.4 Data types in MATLAB

MATLAB GUI

App Designer is an interactive development environment for designing an application layout and programming its behavior. It provides a fully integrated version of the MATLAB editor and a large set of interactive UI components. It also offers Grid Layer Manager to organize your user interface and automatic reflow options to detect and respond to changes in your application screen size. The App Designer allows you to create a professional software developer without the need for professional applications. Use a graphical user interface (GUI) and an integrated editor to quickly program its behavior.

We can share apps using MATLAB Drive, or create standalone desktop or web applications with the MATLAB Compiler Sim and Simulink Compiler.

CHAPTER 06

RESULT AND DISCUSSION

When the program is running the images are loaded and the features are extracted. The extracted features are stored in a variable which are visible in the workspace. Then asks for a face which has to be recognized. In the new tab the matched face and query face were shown. And the name of the person is displayed in the command window. The accuracy of the project is 95%.
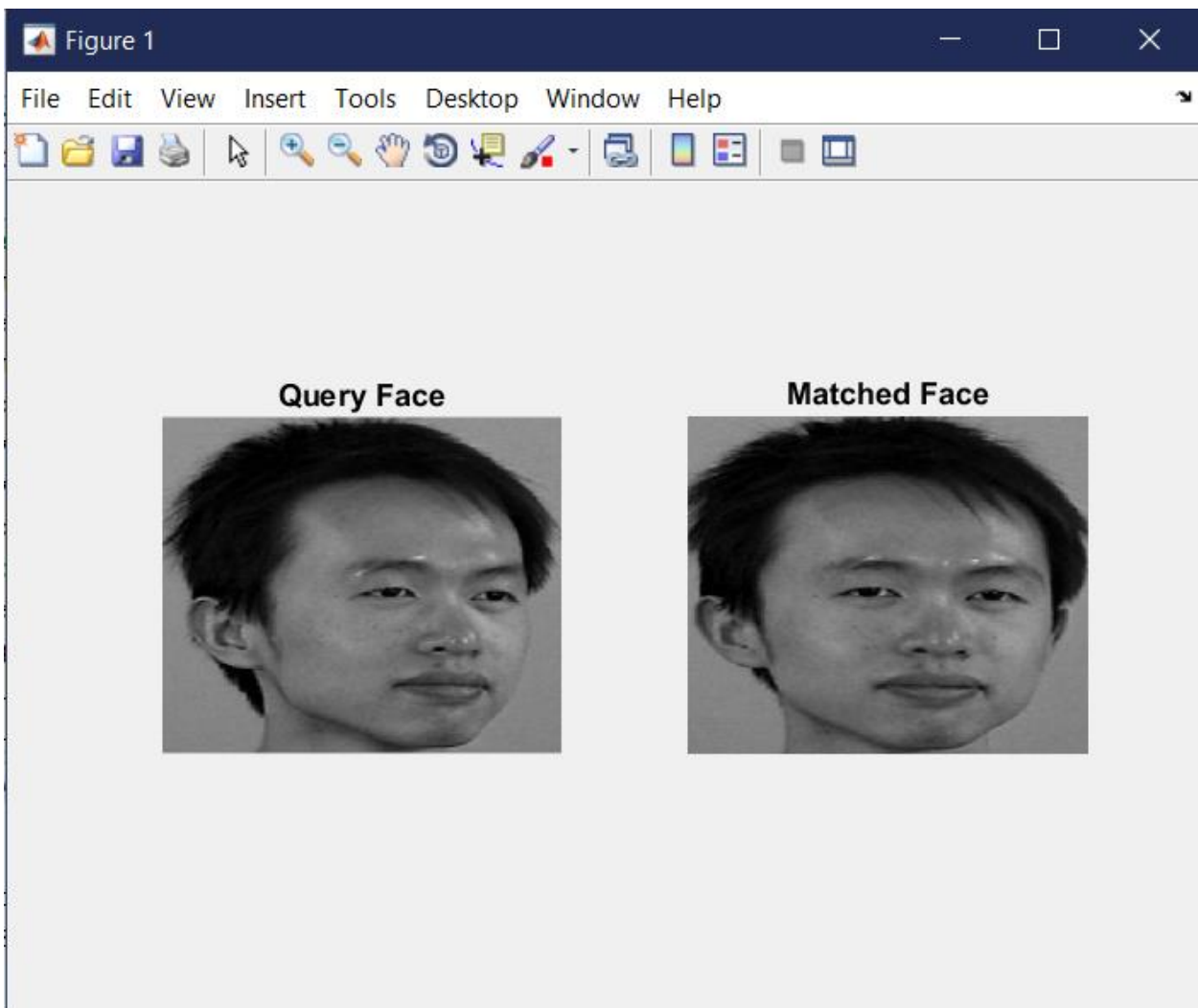
Result using only MATLAB code

Figure 6.1 Output Image

Result Obtained by using MATLAB Graphical user interface

When the project is running in a MATLAB GUI, it asks for the input image to be tested and the outputs matched image and query image are displayed side by side and the name of the person is displayed in the middle.
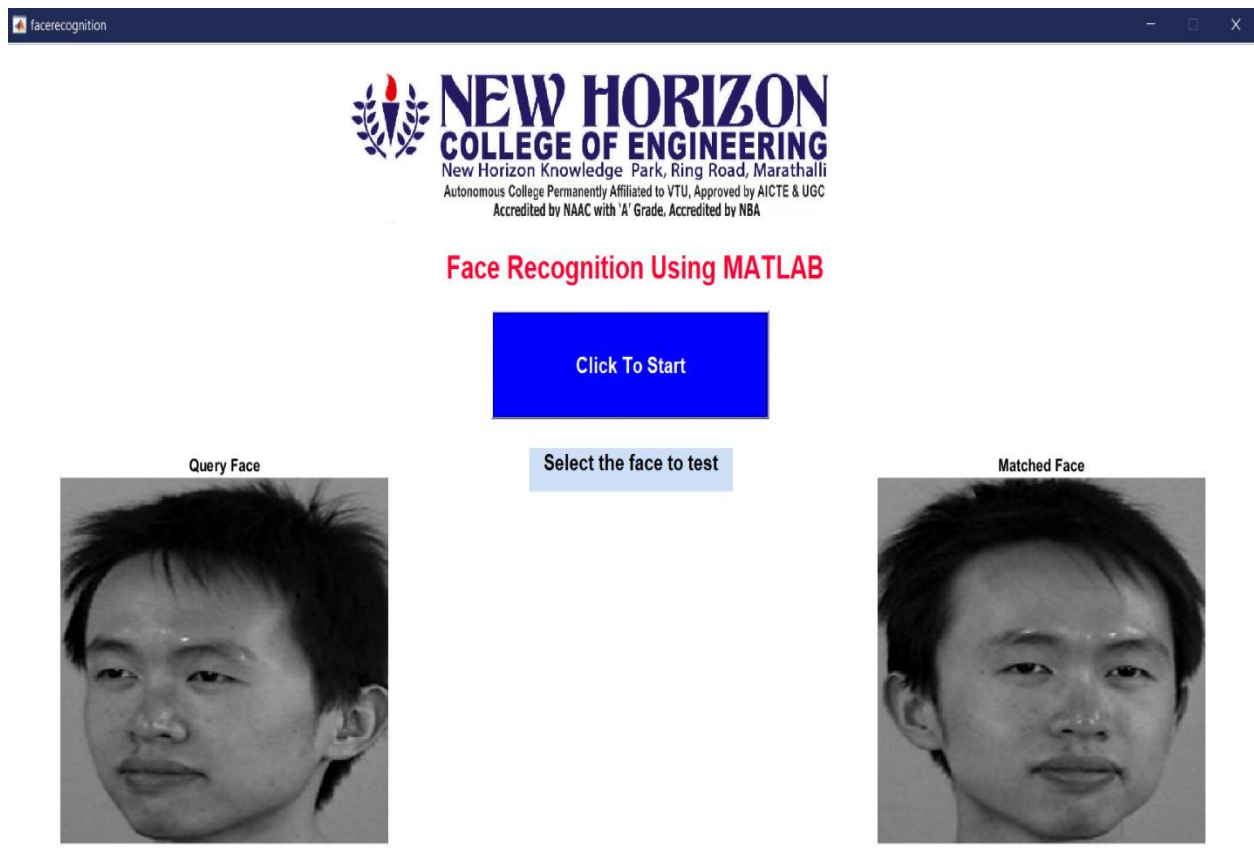

Figure 6.2 Output using MATLAB Graphical user interface

As we got the output at last and the accuracy is also good. Our team members are gone through some of the papers and they came with the different ideas and were discussed. Then final algorithm and divided the work.

CHAPTER 07

ADVANTAGES AND APPLICATIONS

Advantages

- Facial recognition is generally useful to use for facial confirmation than for distinguishing proof purposes, as it is unreasonably simple for somebody to adjust their face, highlights with a camouflage or veil, and so forth. Condition is a thought just as subject movement and spotlight on the camera.

- Automated time following system: Automation improves time following, and there is no compelling reason to have work force to screen the system 24 hours per day.

- Tighter security: Facial biometric time following permits you to follow representatives as well as add guests to the system so they can be followed all through the worksite. Access can be denied to any individual not in the system.

- Time sparing and diminished disease: With facial recognition, workers can enter and leave the office in impressively less time. There is no compelling reason to contact the surface of the system to check in or out. This spares time, just as limiting the spread sicknesses because of physical contact.

- Ease of combination: Biometric facial recognition innovation can be effectively modified into your time and participation system

- Accuracy guarantees that there won't be any false impressions and uncool ponderousness that originates from terrible face recognition programming. With significant levels of precision, you'd sure that the opportune individual will be perceived at the correct time.

Applications

- Face recognition can be utilized together with reconnaissance cameras to naturally recognize missing youngsters, undesirable subjects in gambling club's or outlaw hoodlums for which an image is enrolled in a focal database.

- Different arrangements exist for both little and enormous organizations, just as for private use, that apply face recognition for get to control to PC systems. Programming and a web cam can be utilized for quite a while rather than secret key and pin.

- Sensible Vision has built up a face recognition programming that utilizations such standard cameras to verify clients on their PC.

- Institutions have a conventional method for stamping participants at every understudy's name to check their participation. This sort of move call is tedious and dull. By utilizing facial recognition, the participation procedure can be incredibly improved to spare time and give a helpful method to label participants.

- The headways in the capacity to gather and group a lot of individual information have allowed promoters and advertisers to draw nearer than any time in recent memory to their objective clients.

- In the human services part, the utilization of facial innovation isn't only for client recognizable proof or security; it is fairly utilized for clinical experts to distinguish ailments by taking a gander at a patient's highlights.

- In the Forensic Investigation facial recognition can help legal examinations via naturally perceiving people in security film or different recordings.

CHAPTER 08

FUTURE SCOPE

- Today, one of the fields that utilizes facial recognition the most is security. Facial recognition is an exceptionally viable device that can help law authorities perceive hoodlums and programming organizations are utilizing the innovation to assist clients with getting to their innovation.

- This innovation can be additionally evolved to be utilized in different roads, for example, ATMs, getting to secret records, or other touchy materials. This can make other safety efforts, for example, passwords and keys old.

- Another way that trend-setters are hoping to execute facial recognition is inside trams and other transportation outlets. They are hoping to use this innovation to utilize faces as charge cards to pay for your transportation expense. Rather than setting off to a corner to purchase a ticket for a passage, the face recognition would take your face, run it through a system, and charge the record that you've recently made. This might smooth out the procedure and upgrade the progression of traffic definitely.

- In future the checking utilizing face recognition can likewise be utilized at AVIATION with the goal that individuals can profit paperless travel at air terminals. With progress and headway in the innovation the boarding, checking-in, looking voluntarily be without bother.

- In diversion division likewise it tends to be utilized like individuals can gain admittance to multiplex film with simply their picture recorded at the passageway and there won't be any lines for the tickets close to the counter. This will give relaxation and accommodation to the group of people yet to come.

CHAPTER 09

CONCLUSION

Face recognition systems are a piece of facial picture preparing applications and their centrality as an examination territory are expanding as of late. Usage of system are wrongdoing anticipation, video observation, individual check, and comparative security exercises. The objective is reached by face discovery and recognition techniques. Information Based face identification strategies are utilized to discover, find and concentrate faces in gained pictures. The computational models, which were executed in this undertaking, were picked after broad research, and the effective testing results affirm that the decisions made by the analyst were dependable. This system was tried under strong conditions in this test study and it is conceived that true execution will be undeniably progressively precise. The completely computerized frontal view face location system showed for all intents and purposes immaculate exactness and in the analyst's sentiment further work need not be led here. A main consideration in the advancement of the program is to expel all issues that were related with photograph. Obstructions that emerge from sitting around idly and time on paper, until agent issues from the homeroom, will be totally dispensed with.

In this manner, attractive outcomes with an easy to understand interface are normal later on, in the system. The adequacy of the program can be expanded by fusing different advances and procedures into the creating phases of the program.

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1.MATLAB

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APPENDIX

MATLAB code

```matlab
faceDatabase = imageSet('facedata','recursive');

[training,test] = partition(faceDatabase,[0.8 0.2]);

trainingFeatures =
zeros(size(training,2)*training(1).Count,64584);
featureCount = 1;
for i=1:size(training,2)
    for j = 1:training(i).Count
        trainingFeatures(featureCount,:) =
extractHOGFeatures(read(training(i),j));
        trainingLabel{featureCount} =
training(i).Description;
        featureCount = featureCount + 1;
    end
    personIndex{i} = training(i).Description;
end

faceClassifier = fitcecoc(trainingFeatures,trainingLabel);

[fname,path]=uigetfile('.jpg');
fname=strcat(path,fname);
im=imread(fname);
person = im;
queryImage = person;
queryFeatures = extractHOGFeatures(queryImage);
personLabel = predict(faceClassifier,queryFeatures)


booleanIndex = strcmp(personLabel, personIndex);
integerIndex = find(booleanIndex);
subplot(1,2,1);imshow(queryImage);title('Query Face');
subplot(1,2,2);imshow(read(training(integerIndex),1));title
('Matched Face');
```

Code for MATLAB GUI

```matlab
function varargout = facerecognition(varargin)
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn',
@facerecognition_OpeningFcn, ...
                   'gui_OutputFcn',
@facerecognition_OutputFcn, ...
                   'gui_LayoutFcn',  [] , ...
                   'gui_Callback',   []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State,
varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end



function facerecognition_OpeningFcn(hObject, eventdata,
handles, varargin)
handles.output = hObject;


axes(handles.axes1);
imshow('nhce.jpg');

guidata(hObject, handles);
function varargout = facerecognition_OutputFcn(hObject,
eventdata, handles)
varargout{1} = handles.output;



function edit1_Callback(hObject, eventdata, handles)

function edit1_CreateFcn(hObject, eventdata, handles)
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
```

```
end



function pushbutton1_Callback(hObject, eventdata, handles)
faceDatabase = imageSet('facedata','recursive');

[training,test] = partition(faceDatabase,[0.8 0.2]);

trainingFeatures =
zeros(size(training,2)*training(1).Count,64584);
featureCount = 1;
for i=1:size(training,2)
    for j = 1:training(i).Count
        trainingFeatures(featureCount,:) =
extractHOGFeatures(read(training(i),j));
        trainingLabel{featureCount} =
training(i).Description;
        featureCount = featureCount + 1;
    end
    personIndex{i} = training(i).Description;
end

faceClassifier = fitcecoc(trainingFeatures,trainingLabel);


[fname,path]=uigetfile('.jpg');
fname=strcat(path,fname);
im=imread(fname);
person = im;
queryImage = person;
queryFeatures = extractHOGFeatures(queryImage);
personLabel = predict(faceClassifier,queryFeatures);

booleanIndex = strcmp(personLabel, personIndex);
integerIndex = find(booleanIndex);
axes(handles.axes4);
imshow(queryImage);title('Query Face');
axes(handles.axes3);
imshow(read(training(integerIndex),1));title('Matched
Face');
```