

fWE

by sasanapusruzan

Submission date: 18-Apr-2021 04:43PM (UTC+0900)

Submission ID: 1561618161

File name: Automatic_attendance_system_using_matlab_report_2.docx (1.82M)

Word count: 8724

Character count: 56973

AUTOMATIC ATTENDANCE SYSTEM USING MATLAB

Submitted in partial fulfilment of the requirements for the award of

Bachelor of Engineering in
Electronics and Communication Engineering

by

Aashik Villa (37130003)

Adigopula Mahesh Babu (37130007)



DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING

SCHOOL OF ELECTRICAL AND ELECTRONICS ENGINEERING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade "A" by NAAC

JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI - 600 119

APRIL - 2021



SATHYABAMA
INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)

Accredited with "A" grade by NAAC

Jeppiaar Nagar, Rajiv Gandhi Salai, Chennai, 600119

www.sathyabama.ac.in



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION
ENGINEERING**

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Aashik Villa (37130003) and Adigopula Mahesh babu(37130007) who carried out the project entitled "AUTOMATIC ATTENDANCE SYSTEM USING MATLAB" under our supervision from October 2020 to March 2021.

Internal Guide

Dr.M Devika,Ph.D, Assistant Professor, Dept of ECE,
Sathyabama Institute of Science and Technology

Head of the Department

Dr.T.RAVI, M.E.,Ph.D

Submitted for Viva voce Examination held on _____

Internal Examiner

External Examiner

DECLARATION

We Aashik Villa (Reg.No:37130003) and Adigopula Mahesh Babu (Reg.No:37130007) hereby declare that the Project Report entitled Automatic Attendance System Using Matlab is done by us under the guidance of Assistant professor M Devika is submitted in partial fulfillment of the requirements for the award of the degree in Electronics and Communication Engineering.

1.

DATE:

2.

PLACE:

SIGNATURE OF THE CANDIDATES

ACKNOWLEDGEMENT

We are pleased to acknowledge our sincere thanks to Board of Management of SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY for their kind encouragement in doing this project and for completing it successfully. We are grateful to them.

We convey our thanks to Dr. N.M. NANDHITHA, M.E., Ph.D., Dean, School of Electrical and Electronics and Dr. T. RAVI, M.E., Ph.D., Head of the Department, Dept. of Electronics and Communication Engineering for providing me necessary support and details at the right time during the progressive reviews.

We would like to express my sincere and deep sense of gratitude to my Project Guide Assistant professor M Devika, Ph.D., for his valuable guidance, suggestions and constant encouragement paved way for the successful completion of my project work. It's been an honor working with him. Thanks for everything.

We wish to express my thanks to all Teaching and Non-teaching staff members of the Department of Electronics and Communication Engineering and our parents who were helpful in many ways for the completion of the project.

ABSTRACT

Overseeing participation can be a tremendous weight whenever done physically. It is a misuse of both asset and time. To take care of this we have planned a programmed application. By utilizing this technique, the issue of intermediaries and students being marked present despite the fact that they are not actually present can without much of a stretch be tackled.

We have proposed a method in this paper that executes application utilizing Matlab. This application depends on face like feature detection, denotes the participation by recognising the individual in the database. The total application design and algorithms utilized in each phase of the task are portrayed in this paper. Different continuous situations are considered to assess the presentation of this face recognition application. This paper likewise proposes methods to be utilized to deal with the dangers like parodying. This programmed participation framework utilizes essentially two calculations for example Viola Jones Algorithm and Principle Component Analysis calculation. Viola Jones algorithm is utilized for face detection and Principle Component Analysis is utilized for face recognition.

CONTENTS

Sl. No	CHAPTER	PAGE
	Abstract	6
1	Introduction	9
	1.1 Objective	10
	1.2 Existing System and Proposal System	10
	1.2.1 Existing system	10
	1.2.2 Proposed system	11
2	Literature survey	13
3	Aim and scope of the work	14
	3.1 Aim	14
	3.2 Scope	14
	3.3 Experimental Flow	15
4	Experimental or materials and methods	17
	4.1 Introduction to Nano Technology	17

	4.2 Introduction to The Viola-Jones Algorithm	26
	4.3 PCA	34
	4.4 Instrumentation	38
5	Code	41
6	Result and Discussion	57
7	Summary and Conclusion	60

CHAPTER 1

INTRODUCTION

Face recognition is the analysis of facial features of a person's image taken from the camera. It measure the complete facial feature like distances between two eyes, length of nose, distance between mouth, and length between jaw edges. These characteristics are stored in the database and used for comparison whenever the user upload the photo. Face recognition is a strong area of research and successful application of image processing.

The normal method of attendance is manual to maintain the stats of lectures, salary and work hours. This type of attendance is basically maintained using attendance book. These normal marking methods are monotonous, time consuming and requires addition resource to maintain them. These normal recorded attendance can be manipulated very easily. Due to these problems in manual attendance system, some of the colleges have shifted to biometric technique but biometric system serves only one person at a time which is time consuming and not so user friendly.

In this paper we have proposed an automatic attendance system that tackles most of these problems faced in manual attendance system as well as in biometric system. The images uploaded by the user are used by computer programmed system for further calculation. The images are compared with reference images of each of the employees or students to mark their respective attendance.

The challenge of facial recognition lies in various factors from facial characteristics such as illumination, quality like resolution geometry like distance and viewpoint and noise ratio factor,image background disturbance. It is the strength to identify a person's identity depending on their face features. This technology is being researched extensively from the past few years because of its applications which range over wide domains.

1.0 OBJECTIVE

Our main objective is to develop an automatic attendance system which is based on facial recognition. To get the best performance, we have tried to use those testing images and training images in which facial features are visibly clear and bright. This application shows better accuracy when the testing images and training images are taken from similar quality of camera. It is important for the person to first register in the face database before actually using the application. This can be done using the by logging as admin. The final attendance is marked in the excel database which can be accessed and modified through admin login.

1.1 EXISTING SYSTEM AND PROPOSED SYSTEM

1.1.1 *Existing system*

Biometric system is used for more secure alternative authentication in comparison to passwords or secured ID cards due to its reliability, which can be utilized in many specific devices designed for security. There are various techniques of biometrics that vary according to the used material, one common of them is the face recognition system that commonly used for secure entry into restricted facilities. Face acknowledgment depends on the utilization of pictures straightforwardly. The principal type that utilizes the picture information are the strategies of appearance, the greater part of them rely upon a portrayal of pictures that prompts a vector space structure and requires thick correspondence. These methodologies are called appearance-based or see based methodologies because of they address an article regarding different item sees. To appropriate the article picture vectors in the vector space they utilize measurable strategies for break down, and infer a powerful portrayal in the component space as per different applications. There are 3 classic linear appearance-based classifiers are found, they are: (PCA), independent component analysis (ICA). Grey level co-occurrence matrix (GLCM) algorithm was enriched for Dua'a Ali Kareem et al Vol.7 Issue.1, January- 2018, pg. 68-77 © 2018, IJCSMC All Rights Reserved 69 c While used 2 methods for extracting the feature vectors using GLCM for face classification. The outcomes exhibit that the subsequent strategy, which utilizes GLCM straightforwardly, is better than the primary technique that

utilizes the component vector which contains the factual Haralick highlights in both closest neural organizations classifiers. Likewise [4] utilized the face part location (FPD) calculation and the recently proposed Gray Level Co-event Matrix (GLCM) calculation for separated component from the human facial pictures, Performance factors applied here are highlight extraction exactness and execution time it is seen that the proposed GLCM calculation removed the highlights more precisely with least execution time than FPD calculation. In this paper, the theoretical concepts related to the face recognition technique are concerned, in which data analysis and processing are employed. The analysis includes the ability of using statistical features to estimate comparable descriptors are useful in the recognition task. The conceptual combination of GLCM and LDA is employed in terms of features space to improve the representation of the test image for achieving more accurate face recognition results.

1.1.2 Proposed system

Considering all the disadvantages of the the existing method, we wanted to create a simple and efficient system for attendance using face recognition. Our proposed system for attendance has an another layer of security which gives access to only a particular features for use for specified members. Since the details of students are of high importance, they are kept Confidential and are accessible only by the admin. Similarly the training of images can only be accesed by admin. The feature to add photo and collect attendance is gave to the user. This in turn reduces ambiguity and creates a proper structure for the system. This application detects faces using Viola-Jones Algorithm and facial recognition using Principal Component Analysis.

PCA is also known as Hotelling Transform (HT) or Karhunen-Loeve Transform (KLT) It is used for dimensionality reduction.It is quite effective in the fields of Image and signal processing.It is mainly used to reduce size of feature vectors that is used for object recognition and object classification problems.PCA can be implemented using EVD(Eigen Values Decomposition).

After face recognition the respective attendance is marked in the excel database.

This can be accessed and modified through the admin module.

Various trials were done to assess the exhibition of the face acknowledgement application. We will utilize Matlab Graphical User Interface to it make easy to understand and use the application.

CHAPTER 2

LITERATURE SURVEY

A. Facial Recognition

Facial Recognition are a bunch of strategies and calculations that make a PC equipped for ordering and perceiving a face in each picture or video. Facial Recognition utilizes hereditary calculations for example the way humans recognize faces and identifies them and excellent by the variations and improvement of gene and genetic engineering.

Face detection may look simple for us humans, but it is not so easy for computers. The challenge of facial recognition lies in various factors from facial characteristics such as illumination, quality like resolution geometry like distance and viewpoint and noise ratio factor, image background disturbance. It is the strength to identify a person's identity depending on their face features. This technology is being researched extensively from the past few years because of its applications which range over wide domains.

B. MATLAB

MATLAB is a programming language which was developed by MathWorks. It permits network controls, plotting of capacities and information, execution of calculations, development of UIs and also allows to integrate with programs of other programming dialects.

In spite of the fact that MATLAB is plan principally for mathematical registering, a matlab tool stash utilizes the Mu PAD emblematic figuring capacities.

CHAPTER 3

AIM AND SCOPE OF THE PRESENT INVESTIGATION

3.1 AIM

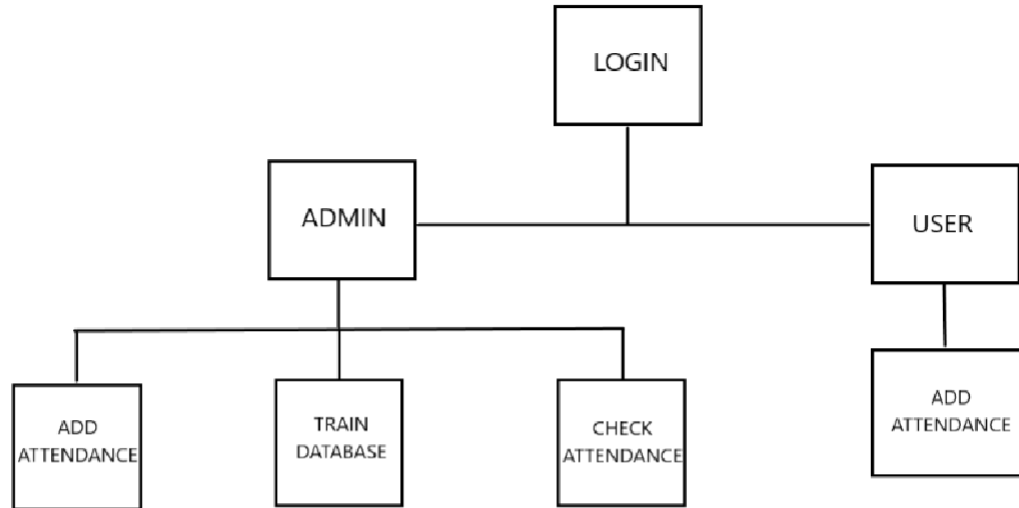
The major aim of the project is to develop automated student attendance system based on face recognition. The main objectives are:

- To detect the face like features in the group image.
- To extract the necessary features from cropped images which are detected.
- To recognise and match with the face image database
- To mark the attendance of the recognised person.

3.2 SCOPE

Facial Recognition is used to recognize the person to better serve him/her. This personalized approach tends to provide better results and greater customer satisfaction. Facial Recognition follows the below flow diagram. It first finds a face in the given image then it converts that image to cropped images and uses algorithms like PCA Algorithm to recognize the facial feature and connect with an existed trained image and current its probabilities. Every institute has its unique way of marking attendance. Some uses the older manual way for marking attendance some uses RF Id for marking attendance.

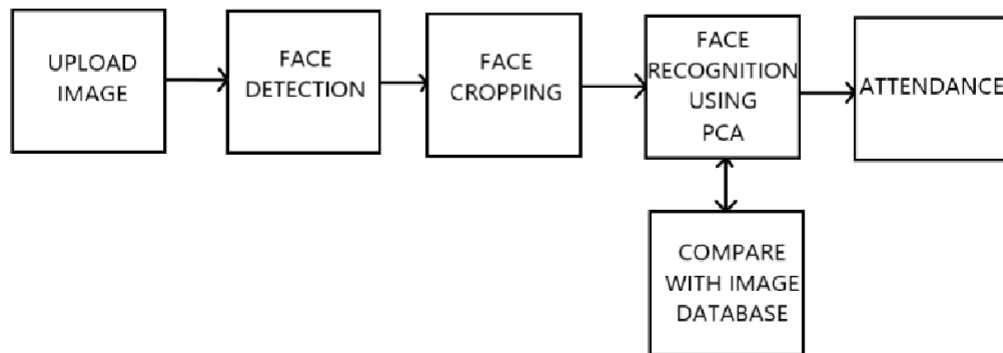
3.3 EXPERIMENTAL FLOW



1)Login: In this login module we have created more security to the attendance system which are admin module and user module.

2)Admin: In this module the admin can add attendance of the student as well as they can train the new students database and can check the attendance of the student searching through register number, date and subject.

3)User: User can upload the group photo and then it will detect the face and match with the nearest face in the database and then it will enter the data into the excel sheet which is our database.



In this paper we have proposed an automatic attendance system that tackles most of these problems faced in manual attendance system as well as in biometric system. The images uploaded by the user are used by computer programmed system for further calculation. The images are compared with reference images of each of the employees or students to mark their respective attendance.

The challenge of facial recognition lies in various factors from facial characteristics such as illumination, quality like resolution geometry like distance and viewpoint and noise ratio factor, image background disturbance. It is the strength to identify a person's identity depending on their face features. This technology is being researched extensively from the past few years because of its applications which range over wide domains.

CHAPTER 4

EXPERIMENTAL OR MATERIALS AND METHODS

4.1 INTRODUCTION TO FACE RECOGNITION

Face recognition is a technique for identifying or verifying a person's personality by looking at their face. Face recognition frameworks can be used to recognize people in photos, videos, or in real time. During traffic stops, law enforcement officers can also use mobile phones to identify individuals.

Face verification results, on the other hand, can be skewed to trap people for violations they haven't committed. Facial affirmation writing computer programmes are especially horrifying because African Americans and other ethnic minorities, women, and youths are routinely misidentified or forgotten, affecting such social affairs in a unique way.

Face recognition has also been used to target people who are participating in a safe conversation. Face recognition innovation is likely to become more widespread in the near future. It may be used to map people's movements around the world in the same way as mechanised tag readers track cars by plate numbers. Face recognition is also being used in a variety of countries, and at sporting events in the United States.

Why face recognition?

Biometrics is a technique for identifying and authenticating an individual based on a collection of identifiable and verifiable data that is distinctive and special to that person.

Visit our biometrics web dossier for more information on biometrics description.

- These computerised frameworks can be used to recognise or verify people's personalities in a matter of seconds based on their facial features (math): eye separation, nose extension, lip shape, ear shape, jawline, and so on. They will do this in a crowded atmosphere as well as in complex and chaotic situations. The exhibition put on by Thales' Live Face Identification System (LFIS), a high-level scheme made possible by our long-standing biometrics expertise, is proof of this.

The chosen biometric benchmark is now facial biometrics.

That's how it's easy to set up and use. The end-user is not expected to communicate physically.

Furthermore, the verification/identification processes for face detection and face match are fast.

4.1.1 What is facial recognition used for?

1. Security - law enforcement



To equate different forms of biometrics, forensic experts may use Automated Biometric Identification Systems (ABIS).

Increased activity to fight violence and extremism is driving this business.

The advantages of facial acknowledgment frameworks for policing are clear: location and counteraction of wrongdoing.

- This arrangement has been contrived to work with advancement from unique finger impression acknowledgment to facial acknowledgment during 2018.
- Robots combined with aeronautical cameras make for an intriguing the June 2018 issue of the Keesing Journal of Documents and Identity, certain floating robot

structures can transport a 10-kilo camera focal point capable of recognising a criminal from 800 metres to a height of 100 metres. The robot has an infinite force supply so it can connect to the ground with a force connection. The communication with ground control, which often uses a channel, cannot be caught.

- Identification of faces CCTV services can help carry out public security missions more effectively. Let's look at four reasons to demonstrate this:

1. Locate children who have gone missing and parents who are confused.
2. Locate and identify abused infants.
3. Hunt down and identify suspects.
4. Encourage and expedite inquiries.

1. Locate children who have gone missing and parents who are confused.

acknowledgment of the face aid administrators' allowing them to upload a snapshot given by the lost youngster's family and compare it to previous looks of the face taken on camera. Face recognition will be used by police to search for video groups of the assessed was reported unavailable.

Cops may all the more likely sort out the kid's developments prior to disappearing and find where he/she was most recently seen. A continuous alarm can trigger a caution at whatever point there's a match. Police would then be able to affirm its precision and do what's important to recuperate the missing kids.

2. Locate and identify abused infants.

Confining the appearances of explicit people in a video arrangement is basic. It can speed up agents' positions in kid misuse cases too.

Video examination can help fabricate orders, track action on a guide, uncover subtleties, and find non-clear associations among the major parts for a situation.

3. Hunt down and identify suspects.

Acknowledgment of the face CCTV will be used to help officers track down and identify previous lawbreakers suspected of committing a new offence. Police should also take preventative measures.

4. Encourage and expedite inquiries

Facial acknowledgment CCTV frameworks can be utilized to help specialists looking for proof in the consequence of an occurrence.

Capacity to seclude suspects and people's looks is basic in speeding up examiners' survey of video proof for important subtleties. They can more readily see how circumstances created.

2. Health

In this sector, significant progress has been made.

Deep learning and facial recognition have now made it possible to:

- track a patient's drug usage more reliably
- encourage the use of pain relief techniques. In this sector, significant progress has been made.

Deep learning and facial recognition have now made it possible to: •detect genetic disorders like DiGeorge syndrome with a 96.6 percent success rate

- encourage the use of pain relief techniques.

3. Banking and retail

This is, without a doubt, the place where facial recognition was least anticipated. Despite this, it could hold the most promise.

In the United States alone, 64 percent of critical financial record openings were completed online in Q2 2020 (and 36 percent in branch).

Plus, expanded portable utilization urges organizations to have a versatile first concentration and grow completely portable easy to understand onboarding encounters.

During the selfie interaction, to stay away from misrepresentation utilizing a static picture, a liveness recognition will be given by the innovation.

The observation of liveness proves that the selfie was shot by a living being.

The result?

Financial institutions (FIs) engage in digital onboarding across online and mobile platforms to adapt to existing customer tastes.

Facial acknowledgment with liveness location improves on internet onboarding and KYC methodology.

It is now possible to dissect consumers behaviour and increase the client purchase metric by installing cameras in retail outlets.

How exactly?

Saks Fifth Avenue, an American department store, is also using such a structure.

#4 Mapping of new users

Face acknowledgment in China

Currently, experts are expanding the facial recognition shades programme, which is being used by police in Beijing's outskirts.

This is related to the Chinese government's creation of a social credit scheme.

According to the Guardian of 2 December 2019, London is ranked #6 and Atlanta is ranked #10.

There's more to come.

In his article dated November 2, 2020, privacy specialist Emmanuel Pernot-Leplay demonstrates this paradox.

Facial recognition in Asia

The 2020 Olympic Games in Tokyo will see a major focus on facial recognition. This technology can be used to recognize accepted people and well-being. In Japan, it's even being used to make mobile banking more convenient.

As of December 2020, it will assign a new computerized personality number to 1.27 billion people.

The responsible body, UIDAI, declared that facial verification will be implemented in a staggered manner by September 2018. In hybrid mode, face confirmation will be available as an additional aid alongside another validation element such as a special symbol, Iris, or OTP.

It will be open to the public with entry to all police stations. The Bureau claims that it can assist officers in apprehending criminals, locating missing people, and identifying bodies.

#5 face recognition in the legal system

Use of facial recognition technology has a significant impact on the legal and social issue of data security.

Do these scientific marvels, which are deserving of science-fiction books, pose a genuine danger to our liberty?

What is our anonymity?

Biometric privacy security in the EU

Yes, you did a good job of reading it. There is also a single rule that applies to 500 million citizens.

This order would almost certainly have diplomatic ramifications.

Biometric privacy security in the United States

As of January 2020, California was the fourth county.

The statute is widely used as a blueprint for federal data protection legislation.

It necessitates the implementation of a network security scheme as well as protective measures for residents of New York State.

The demonstration applies to organizations that gather the individual data of New York inhabitants.

And, law enforcement is included.

There's more.

- In anticipation of the current California statute made the same announcement. California's recent facial identification and other biometric monitoring legislation (Assembly Bill 215) expressly bans the use of police body cameras. As of January 1, 2020, the ban will be in effect for three years.
- According to the Boston Herald, on June 24, 2020, Boston residents voted to boycott police mask observation creativity.
- On September 9, 2020, Portland (Oregon) selected its restriction. " such as private shops. CNN (CNN)

How will new technologies be properly regulated?

So,

- Does this represent a step backward in terms of public safety?
- Do you think there's a legislative vacuum? In what degree are you?

Keep an eye on the results of these talks, as campaigners are putting pressure on the US Congress to ban the technology and providers) to control it.

However, as of January 2021, there is still no federal regulatory mechanism in place to solve the issue.

The EU Commission intends to take action against the widespread use of facial recognition technologies. Ursula von der Leyen, the president of the European Commission, needs a systematic solution to artificial intelligence's human and ethical ramifications. She has promised to release a blueprint for AI regulations as soon as possible.

The European Commission's whitepaper is now available online in its final form.

The controversy is once again centred on issues of anonymity, permission.

In our biometric data dossier, you can learn more about biometric data privacy regulations in the EU, the United Kingdom, and the United States.

Aadhaar, India's national biometric authentication scheme

The Supreme Court of India, in the Puttaswamy judgement of August 27, 2017, it was another measure for the Aadhaar project's expansion.

The ultimate collection of laws and their callings become much more grounded as a result of the bounce back effect.

As the two ministers and watchmen of information insurance guideline, information security officials have gotten fundamental for organizations.

#6 The rebels – facial recognition hackers

These trends have shocked and concerned several parties. Any people have already taken initiative.

Is it possible to deceive facial recognition software?

- In Russia, Grigory Bakunov has designed an answer for get away from the eyes for all time watching our developments and befuddle face location gadgets. He has built up a calculation that makes uncommon cosmetics to trick the product. Notwithstanding, he has decided not to put up his item for sale to the public in the wake of acknowledging how effectively lawbreakers could utilize it.
- He is currently chipping away at garments including examples to forestall identification. The hyperface cover remembers designs for texture, like eyes and mouths, to trick the face acknowledgment framework.
- Generated Media released a platform called Anonymizer in November of 2020. From a photo you can submit, the app produces a sequence of synthetic portraits. According to the website, the photographs are identical to your face and appear to be you, but they can fool face recognition algorithms we attempted Anonymizer. Regardless, the 40+ doppelgangers we sent were a long way from anything like the original image had been moved.

Thomas Smith released an intriguing experiment on the 28th of January 2021 that showed a basic strategy for making yourself invisible.

Wearing a disposable mask and reflective lenses, according to his tests, is an effective combination for making you invisible.

Why?

Anti-spoofing methods are being developed by the industry, and standardisation organisations have defined two specific topics:

1. Verify that the captured image was taken from an object rather than a snapshot or a cover.

2. Verify that at least two people's faces (transformed representations) have not been combined in a reference archive, such as a passport.

4.2 Introduction to The Viola-Jones Algorithm

Algorithm is a real-time object recognition system that enables image attributes to be detected.

In spite of being an obsolete system, It is very effective, and its use in real-time face detection has proven to be particularly noteworthy.

1. How it works

The Viola-Jones Algorithm has two stages:

1. Training
2. Detection

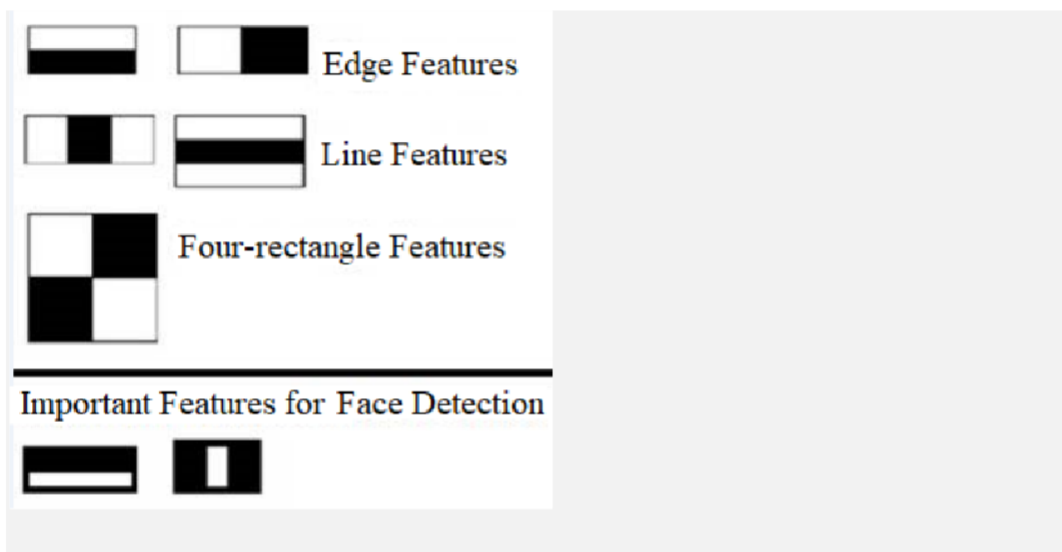
Detection

Viola-Jones was designed to distinguish front-facing faces the most, as opposed to faces that are gazing backwards, sideways, or downwards. After moving through each tile in the picture, the container moves a stage to one side.

With more modest advances, various boxes identify face-like highlights (Haar-like highlights) and the information of those containers set up, assists the calculation with figuring out where the face is.

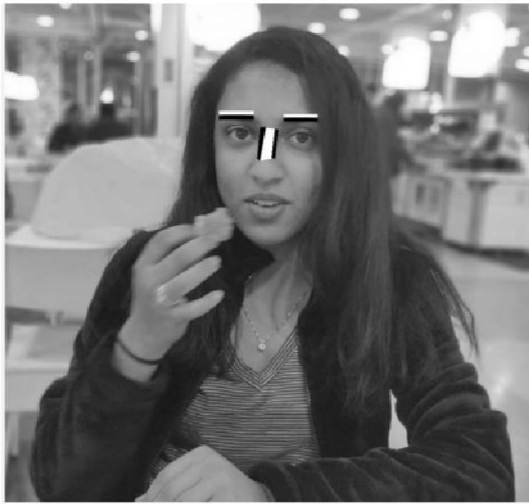
Haar like Features

As in the edge of a brow, one hand can be lighter than the other at times. The middle part of the box can be brighter than the adjacent spaces, which may mistaken for the nose.



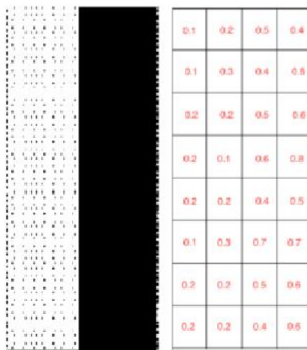
Viola and Jones described three forms of Haar-like features :

four sided features. line features, ,Edge features,



Consider how a black-and-white photograph of a table's edge will appear. As you can see in the image above, one side would be lighter than the other, giving it a b&w effect.

In addition, when the photographs are examined, each element has its own meaning. It's easy to figure out: Subtract the White and Black areas.



For showing, I picked a 4 x 8 network, yet truly, there would be a lot more pixels and along these lines a lot bigger framework for a specific component.

In this case, the value is →

$$(0.5 + 0.4 + 0.5 + 0.6 + 0.4 + 0.7 + 0.5 + 0.4 +$$

$$0.4 + 0.5 + 0.6 + 0.8 + 0.5 + 0.7 + 0.6 + 0.6) -$$

$$(0.1 + 0.1 + 0.2 + 0.2 + 0.2 + 0.1 + 0.2 + 0.2 +$$

$$0.2 + 0.3 + 0.2 + 0.1 + 0.2 + 0.3 + 0.2 + 0.2)$$

Integral Image

We determined the importance of a function in the previous segment. In fact, since the amount of pixels in a big feature is much higher, these measurements can be very time consuming.

The necessary picture has its influence in permitting us to play out these serious estimations rapidly so we can comprehend whether an element of various highlights fit the measures.

8	5	6	4	4	2	3	4	4	3
7	5	6	5	5	6	6	5	5	4
5	5	7	8	9	7	7	6	5	3
2	4	3	3	4	5	6	6	5	4
2	3	4	5	5	6	6	7	5	5

Regular Image

We might simply add up the boxes, but because this is computationally expensive, we'll make an integral image instead.

The number of all the boxes to its left is used to measure the value of a each box in the picture. An example can be seen in the picture below:

8	5	6	4	4	2	3	4	4	3
7	5	6	5	5	6	6	5	5	4
5	5	7	8	9	7	7	6	5	3
2	4	3	3	4	5	6	6	5	4
2	3	4	5	5	6	6	7	5	5

Regular Image

Integral Image

The number of the highlighted region in the normal image is used to measure the green box in the integral image. We'd have a series going through the grid if we did this with each box, and it would look like the picture below.

8	5	6	4	4	2	3	4	4	3
7	5	6	5	5	6	6	5	5	4
5	5	7	8	9	7	7	6	5	3
2	4	3	3	4	5	6	6	5	4
2	3	4	5	5	6	6	7	5	5

Regular Image

8	13	19	23	27	29	32	36	40	43
15	25	37	46	55	63	72	81	90	97
20	35	54	71	79	94	110	125	139	149
22	41	63	83	95	115	137	158	177	191
24	46	72	97	114	140	168	202	226	245

Integral Image

8	5	6	4	4	2	3	4	4	3
7	5	6	5	5	6	6	5	5	4
5	5	7	8	9	7	7	6	5	3
2	4	3	3	4	5	6	6	5	4
2	3	4	5	5	6	6	7	5	5

Regular Image

8	13	19	23	27	29	32	36	40	43
15	25	37	46	55	63	72	81	90	97
20	35	54	71	79	94	110	125	139	149
22	41	63	83	95	115	137	158	177	191
24	46	72	97	114	140	168	202	226	245

Integral Image

Everything we have to do now is add the purples and remove the greens from the four corners of our feature.

$$\rightarrow 168 - 114 + 79 - 110 = 23$$

So, what's the point of using the integral image?

We already know the total size of a given square, so all we have to do is to determine the gap between two rectangles in the standard image. So, even though the grid is 1000 x 1000 pixels, the integral picture approach simplifies the measurements.

Training Classifiers

Let's move on to teaching now that we've discussed identification.

The measurement reduces the image to 25 x 25 pixels and looks for the prepared highlights inside the photo. To be able to see highlights in the special and evolving systems. That is why we must include a large amount of facial image data to the equation in order for it to be prepared. Viola and Jones calculated 4,960 images for their project (each physically marked). You should take note of the same representation of a single picture with such images, which will be pristine data for a PC.

Adaptive Boosting (AdaBoost)

Once we've looked at all of the possible locations and variations of those elements, we'll have an extremely reliable model. Because of all the various possibilities and variations you'd have to search for each frame or photograph, training can be very lengthy.



$$F(x) = \alpha_1 f_1(x) + \alpha_2 f_2(x) + \alpha_3 f_3(x) + \dots$$

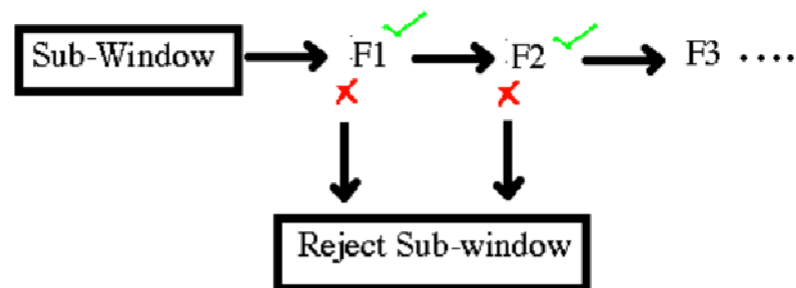
Each function is referred to as a weak classifier. Because one weak classifier can't be as successful as two or three weak classifiers, we get a strong classifier when we combine two or three weak classifiers. It gets more and better as you keep contributing to it. This is referred to as an orchestra.

Let's assume you have ten images, five of which are facial and five of which are not.

As a result, it looks for a function that complements the new best feature rather than one that competes with it. When new additions are introduced, we will eventually come down to one picture that will be given more weight. The algorithm has been refined and can accurately quantify all positives and negatives.

1. Cascading

$$F(x) = a_1f_1(x) + a_2f_2(x) + a_3f_3(x) \dots$$



2.

Cascading is another “hack” we can use to improve our model's speed and accuracy. So we start by opening a sub window and looking for our most significant or best function inside the sub window to see if it is present in the picture within the subwindow. We don't really glance at the sub window if it's not in the sub window; If it isn't there, the subwindow is rejected. We continue to look for sub windows that have a certain amount of features and reject those that don't. While evaluations can take just a few seconds, doing so for each function will take a long time. Cascading greatly accelerates this operation, allowing the computer to produce data even more quickly.

Conclusion

So, only a few final thoughts on the Viola-Jones Algorithm:

- It was the first of its kind and was mostly used for facial recognition applications.
- The algorithms are divided into two parts:
- We have two steps for preparation: training the classifiers and Adaboost

4.3PCA

Introduction

The Principal Component Analysis (PCA) is perhaps the best strategies that have been utilized in picture acknowledgment and pressure. PCA is a measurable technique under the expansive title of factor investigation. The reason for PCA is to reduce the enormous dimensionality of the information space (noticed factors) to the more modest inherent dimensionality of highlight space (free factors), which are expected to portray the information monetarily. This is the situation when there is a solid relationship between's noticed factors. The positions which PCA can do are expectation, repetition evacuation, include extraction, information pressure, and so on Since PCA is an old style procedure which can accomplish something in the direct space, applications having straight models are reasonable, like sign handling, picture preparing, framework and control hypothesis, correspondences, and so on

Eigenfaces, a common face recognition technique, is how it works. Here's where you can get the complete code.

Face Recognition

We must first characterise our dilemma before moving on to principal component analysis. This differs from face recognition, which involves deciding whether or not there is a face in the input picture. We need an existing database of faces for facial recognition.

This strategy has a number of drawbacks. This comparison would take a long time for each face! Let's pretend we're developing a real-time face recognition technology! Our algorithm becomes sluggish as our dataset becomes larger. However, seeing more faces will result in better outcomes!

We don't use the nave form because of these problems. Instead, we'd like to reduce the dimensionality of our high-dimensional images while preserving the meaning or essential sections of the picture.

Dimensionality Reduction

The preceding section explains that we need to use a dimensionality reduction technique. We want to depict higher-dimensional data in a lower-dimensional room, such as photos. As an example, consider the picture below.

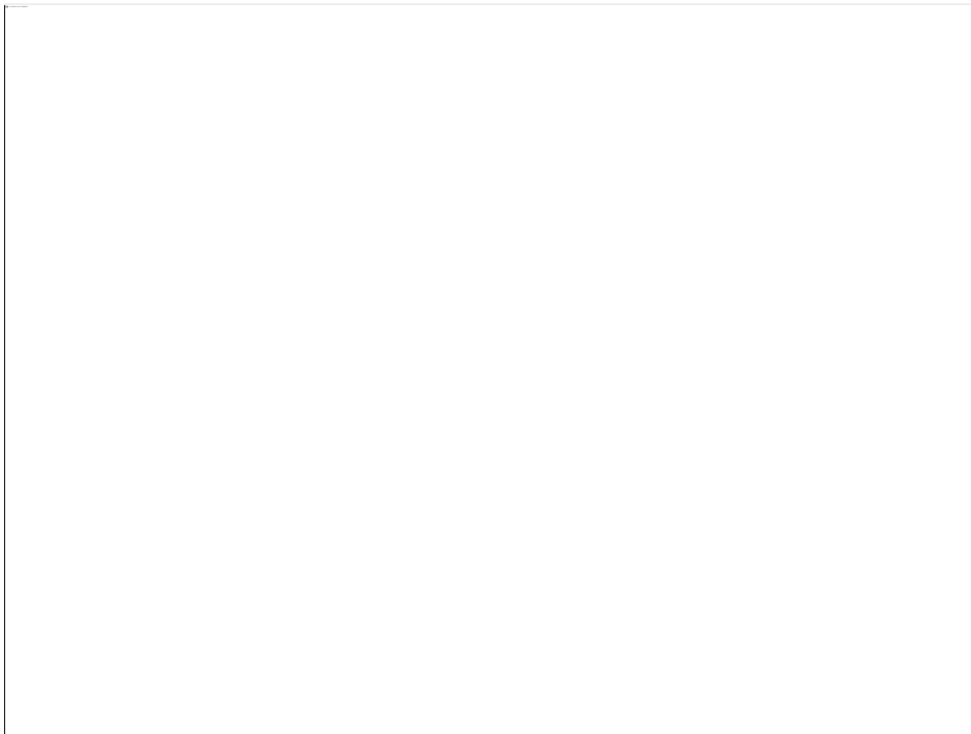


These graphs depict the same results, with the exception that the bottom chart zero-centers it. Since this is unsupervised learning, our results does not have any identifiers attached to them.

Principal Component Analysis

The theory behind PCA is to use a hyperplane that will spread all of the points out the most as they are projected onto it. In other terms, we're looking for the dimension with

the most difference! Consider the plot in the illustration above. The x-axis or y-axis are two possible axes, but neither is the best axis. However, if we draw a diagonal line around our data, it is the axis where the data is most spread out!



The right axis is the longer blue axis! Our points will be maximally spaced if we projected them onto this axis! However, how can we determine this axis? We should use the expression eigenvectors from linear algebra! This is where the word eigenfaces comes from at the largest eigenvectors of the covariance matrix. This are the main axes on which we project our data in order to reduce the number of measurements. By choosing the larger eigenvectors, we can reduce high-dimensional data to a lower dimension using this method.

We're keeping the most critical facets of our data while we're calculating the axes of maximal distribution. When our data is spaced out rather than clumped together, our classifier has a better time separating faces.

What does this have to do with our face recognition problem? Our pictures may be thought of as points in a $m \times n$ -dimensional vacuum. Then we can use PCA to shrink our room into something even more manageable. This will aid in the speeding up of our computations as well as making them more resistant to noise and variance.

Eigenfaces Code

Let's use scikit-learn to write a face recognition algorithm now that we've covered PCA and eigenfaces. The more the recognizer does for a larger range of faces, the better. The more the recognizer does for a larger range of faces, the better. Making a dataset for facial recognition is as simple as making a folder for each user and putting the face images in there. Make sure they're all the same size and resize them if they're too big! Remember that when we project into that vacuum, PCA reduces the image's dimensionality anyway, so using big, (Grayscale photographs are assumed.) The folder names will then be used to distinguish between grades. You can use your own photos for this method.

Now we can only use the PCA class in scikit-learn to do the dimensionality reduction for us! We must choose the number of components we want to minimise down to, i.e., the output dimensionality (the number of eigenvectors to project onto), The transform can be used to reduce our images to a 100-dimensional space. It's worth noting that we're just doing PCA on the training results, not the whole dataset. This is so we can generalize to data we haven't seen before.

We will use the verbose flag to see if our network is training. In addition, we employ early stopping

Consider the graph above. When the accuracy of our validation collection begins to degrade, we find overfitting. To avoid overfitting, we automatically stop training at that stage.

(The plot gallery and titles features have been adapted from the scikit-learn documentation)

For each picture, we can see our network's forecasts as well as the ground truth value.

The eigenfaces themselves are another fascinating thing to imagine. Keep in mind the PCA generates eigenvectors. We can imagine the eigenfaces by reshaping the eigenvectors into images.

Our dataset's "generic" faces are represented by these. You should build applications that use the eigenfaces solution now that we've addressed it!

We spoke about eigenfaces, a common face recognition method. The core of eigenfaces is Principal Components Analysis (PCA), an unsupervised dimensionality reduction algorithm to generate a class mark based on the reduced-dimension input. We used a single-layer neural network as our classifier.

4.4 INSTRUMENTATION

MATLAB (short for "matrix laboratory") is a MathWorks patented multi-paradigm programming language and numeric computing environment. Matrix manipulations, function and data plotting, algorithm execution, user interface creation, and interfacing with programmes written in other languages are all possible with MATLAB.

MATLAB will have more than 4 million users worldwide by 2020. [20] MATLAB users come from a variety of engineering, scientific, and economics backgrounds.

APP designer

Software Designer enables you to create professional software without needing to be a skilled programmer. Simple visual fragments to lay out the design of the

GUI(Graphical User Interface) and use coordinated manager to quickly schedule its behaviour.

Use MATLAB Drive™ to share your applications, or use MATLAB Compiler™ and Simulink Compiler™ to build standalone desktop or mobile apps. Use MATLAB Drive™ to distribute the software, or use MATLAB Compiler™ and Simulink Compiler™ to build standalone work areas or web applications.

Object-oriented programming is a design technique that allows you to describe constructs called objects programmatically, which combine data (properties) with functions that run on that data (methods). You will use MATLAB® to generate artefacts that mimic the actions of real-world devices and systems. These objects can then be used as building blocks in complex system simulation and analysis software.

Define App Behavior

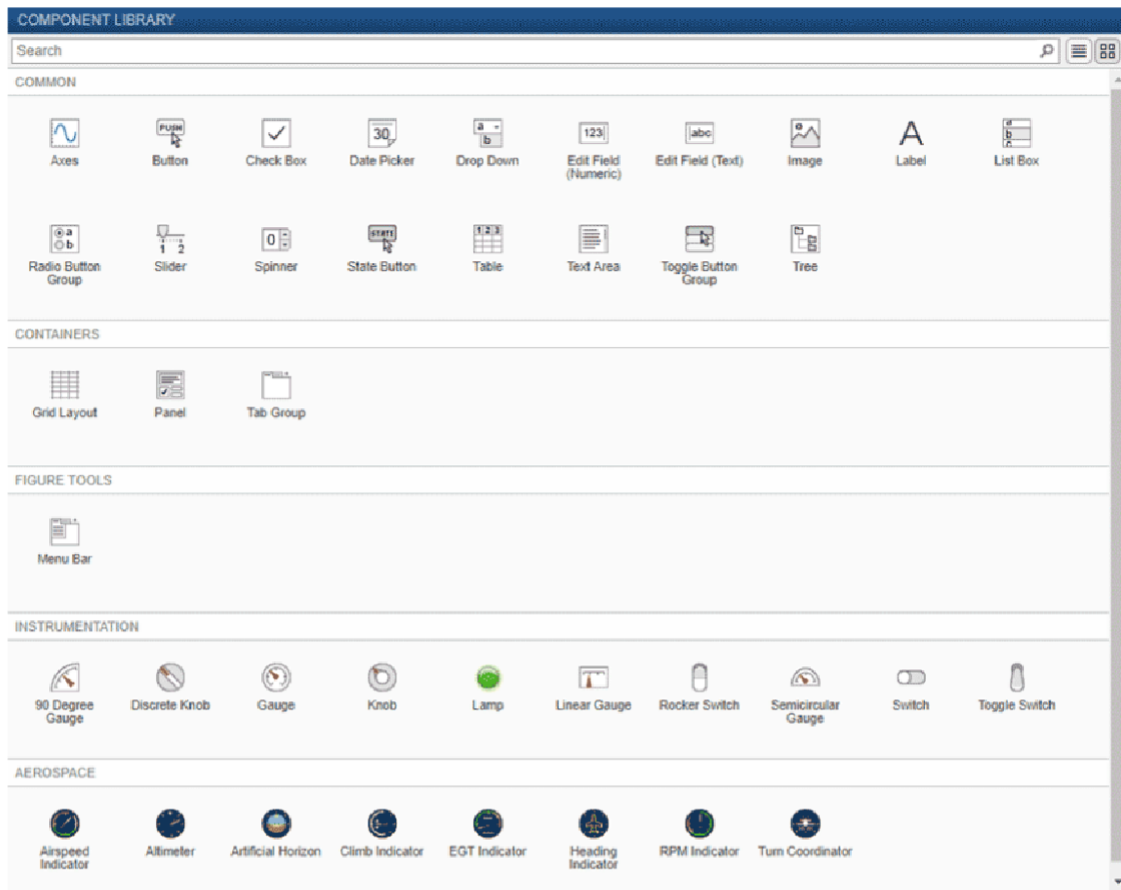
To describe the actions of your app, use the integrated version of the MATLAB Editor. The Code Analyzer in App Designer will automatically search for coding issues. You will see alert and error notifications as you write your code and make changes to your app depending on what you see. A Stateflow® map can also be used to model the app's actions.

Component Library

To organize the client gui, use common segments like captures, check boxes, trees, and drop-down records, as well as buttons, boards, and network designs.

Component Interactions

When a client interacts with your program, add section callbacks and custom mouse and console links. Use 2D and 3D plots in your program, just like tables, to allow users to intelligently investigate data.



Develop stand-alone desktop and web applications

Create and distribute royalty-free standalone applications with other users using Simulink Compiler and MATLAB Compiler . You can also use MATLAB Mobile App Server to bundle the applications like progressive web apps and share them. The web apps can be run directly from the browser without the need to instal any extra applications.

CHAPTER 5

Code

The below code is for login module

```
classdef Login < matlab.apps.AppBase

    properties (Access = public)
        UIFigure matlab.ui.Figure
        LoginButton matlab.ui.control.Button
        UserIDEditFieldLabel matlab.ui.control.Label
        UserIDEditField matlab.ui.control.EditField
        PasswordEditFieldLabel matlab.ui.control.Label
        PasswordEditField matlab.ui.control.EditField
    end

    methods (Access = private)

        function LoginButtonPushed(app, event)
            if(app.UserIDEditField.Value=="admin" && app.PasswordEditField.Value=="admin")
                Admin
            elseif(app.UserIDEditField.Value=="user" && app.PasswordEditField.Value=="user")
                User
            else
                msgbox('Incorrect Details','modal')
            end
        end

        methods (Access = private)

            function createComponents(app)

                app.UIFigure = uifigure('Visible', 'off');
                app.UIFigure.Position = [100 100 640 480];
                app.UIFigure.Name = 'MATLAB App';

                app.LoginButton = uibutton('Login', 'push');
                app.LoginButton.Position = [235 185 475 205];
                app.LoginButton.ButtonData = @LoginButtonPushed, true;

                app.UserIDEditFieldLabel = uilabel(app.UIFigure);
                app.UserIDEditFieldLabel.HorizontalAlignment = 'right';
                app.UserIDEditFieldLabel.Position = [190 313 46 22];
                app.UserIDEditFieldLabel.Text = 'User ID';
```

```

app.UserIDEditField = uieditfield(app.UIFigure, 'text');
app.UserIDEditField.Position = [251 313 100 22];

app.PasswordEditFieldLabel = uilabel(app.UIFigure);
app.PasswordEditFieldLabel.HorizontalAlignment = 'right';
app.PasswordEditFieldLabel.Position = [178 256 58 22];
app.PasswordEditFieldLabel.Text = 'Password';

app.PasswordEditField = uieditfield(app.UIFigure, 'text');
app.PasswordEditField.Position = [251 256 100 22];

app.UIFigure.Visible = 'on';
end
end

methods (Access = public)

function app = Login

    createComponents(app)

    registerApp(app, app.UIFigure)

    if nargin == 0
        clear app
    end
end

function delete(app)

    delete(app.UIFigure)
end
end
end

```

The below code is for the admin module

```

classdef Admin < matlab.apps.AppBase
    properties (Access = public)
        UIFigure matlab.ui.Figure
        TabGroup matlab.ui.container.TabGroup
    end
end

```

```

View_Attendance matlab.ui.container.Tab
UITable matlab.ui.control.Table
ResetButton matlab.ui.control.Button
RegNoEditFieldLabel matlab.ui.control.Label
RegNoEditField matlab.ui.control.NumericEditField
SearchButton matlab.ui.control.Button
SubjectEditFieldLabel matlab.ui.control.Label
SubjectEditField matlab.ui.control.EditField
SearchButton_2 matlab.ui.control.Button
SearchButton_3 matlab.ui.control.Button
DatePickerLabel matlab.ui.control.Label
DatePicker matlab.ui.control.DatePicker
LogoutButton_2 matlab.ui.control.Button
Train_Database matlab.ui.container.Tab
UploadButton matlab.ui.control.Button
TrainDatabaseButton matlab.ui.control.Button
PleaseSelect10PicturesLabel matlab.ui.control.Label
ClickthebelowbuttontotrainthedatabaseLabel matlab.ui.control.Label
LogoutButton matlab.ui.control.Button
Image matlab.ui.control.Image
Image2 matlab.ui.control.Image
Image3 matlab.ui.control.Image
Image4 matlab.ui.control.Image
Image5 matlab.ui.control.Image
Image6 matlab.ui.control.Image
Image7 matlab.ui.control.Image
Image8 matlab.ui.control.Image
Image9 matlab.ui.control.Image
Image10 matlab.ui.control.Image
AddAttendanceTab matlab.ui.container.Tab
SubmitButton matlab.ui.control.Button
DatePicker_2Label matlab.ui.control.Label
DatePicker_2 matlab.ui.control.DatePicker
SectionEditFieldLabel matlab.ui.control.Label
SectionEditField matlab.ui.control.EditField
DeparmentEditFieldLabel matlab.ui.control.Label
DeparmentEditField matlab.ui.control.EditField
BatchEditFieldLabel matlab.ui.control.Label
BatchEditField matlab.ui.control.NumericEditField
SubjectEditField_2Label matlab.ui.control.Label
SubjectEditField_2 matlab.ui.control.EditField
RegNumberEditFieldLabel matlab.ui.control.Label
RegNumberEditField matlab.ui.control.NumericEditField
end

properties (Access = private)
% Description
t=readtable("Book1.xlsx","Sheet",6);
end

```

```
methods (Access = private)
```

```
function LoginButtonPushed(app, event)
if(app.UselDEditField.Value=="admin" && app.PsswordEditField.Value=="admin")
app.TextArea.Value="Admin";
elseif(app.UselDEditField.Value=="user" && app.PsswordEditField.Value=="user")
app.TextArea.Value="user";
else
app.TextArea.Value="Incorrect";
end
end
```

```
function ResetButtonPushed(app, event)
app.UITable.Data =app.t;
app.UITable.ColumnName =app.t.Properties.VariableNames;
end
```

```
function SearchButtonPushed(app, event)
filterroll=app.RegNoEditField.Value;
numRows=size(app.UITable.Data,1);
k=1;
for i=1:numRows
if app.UITable.Data{i,1} ~= filterroll
RowstoDel(1,k)=i;
k=k+1;
end
end
app.UITable.Data(RowstoDel,:)=[];
end
```

```
function UploadButtonPushed(app, event)
[filename, pathname]=uigetfile (*.*, 'Select the Input Grayscale Image', 'MultiSelect', 'on') ;
N=length(filename);
%N=2;
handles.N=N;
counter=1;
%x=0;
for j=1:N
%[filename, pathname]=uigetfile (*.*, 'Select the Input Grayscale Image') ;
y=string(filename(j));
filewithpath=strcat (pathname, y);
face=imread(filewithpath);
%savenam = strcat('C:\Users\amahe\OneDrive\Desktop\Test\' ,num2str(counter), '.jpg'); %image
will be saved here
baseDir = 'C:\Users\amahe\OneDrive\Desktop\Test\';
newName = [baseDir num2str(counter) '.jpg'];
handles.face=face;
if(j~=0)
while exist(newName, 'file')
```

```

counter = counter + 1;
newName = [baseDir num2str(counter) '.jpg'];
end
end
fac=imresize(face,[112,92]);
imwrite(fac,newName);
%figure(1);
%imshow(face);
%x=x+1;
%title('crop pic');
%pause(.5);
if(j==1)
app.Image.ImageSource=newName;
elseif(j==2)
app.Image2.ImageSource=newName;
elseif(j==3)
app.Image3.ImageSource=newName;
elseif(j==4)
app.Image4.ImageSource=newName;
elseif(j==5)
app.Image5.ImageSource=newName;
elseif(j==6)
app.Image6.ImageSource=newName;
elseif(j==7)
app.Image7.ImageSource=newName;
elseif(j==8)
app.Image8.ImageSource=newName;
elseif(j==9)
app.Image9.ImageSource=newName;
else
app.Image10.ImageSource=newName;
end
end
end

function TrainDatabaseButtonPushed(app, event)
%Program to implement. face recognition using PCA
n=input('Enter No. of Images for training: ');
L=50;
tic;
M=100; N=90; %Required Image Dimensions
X=zeros (n, (M*N)); %Initialie Data set matrix [X]
T=zeros (n,L); %Initialize Transformed data set [T] in PCA space
for count=1:n
l=imread (sprintf('%d.jpg',count)); %Reading images
l=rgb2gray (l);
l=imresize (l, [M,N]);
X (count, :)=reshape (l,[1,M*N]); %Reshaping images as 1D vector
end
Xb=X; %Copy-database for farther use

```

```

m=mean(X); %Mean of all Images
for i=1:n
X (i,:)=X (i,:)-m; %Subtracting Mean from each 1D image
end
Q= (X'*X) / (n-1); %Finding Covariance Matrix
[Evecm,Evalm]=eig(Q) ; % Getting Eigen values and Eigen vectors of CoV matrix [0]
Eval=diag (Evalm); %Extracting all eigen values
[Evalsorted, Index]=sort (Eval, 'descend'); %Sorting Eigen Values
Evecsorted=Evecm(:, Index);
Ppca=Evecsorted (:,1:L); %Reduced Transformation matrix [Ppca]
%Projecting each image to PCA space
for i=1:n
T(i,:)=(Xb (i,:)-m) * Ppca;
end
end

function SubjectEditFieldValueChanged(app, event)
value = app.SubjectEditField.Value;
end

function SearchButton_2Pushed(app, event)
filterroll=app.SubjectEditField.Value;
numRows=size(app.UITable.Data,1);
k=1;
for i=1:numRows
if ~(strcmp(app.UITable.Data{i,6},filterroll))
RowstoDel(1,k)=i;
k=k+1;
end
end
app.UITable.Data(RowstoDel,:)=[];
end

function SearchButton_3Pushed(app, event)
filterroll=app.DatePicker.Value;
numRows=size(app.UITable.Data,1);
k=1;
for i=1:numRows
if app.UITable.Data{i,2} ~= filterroll
RowstoDel(1,k)=i;
k=k+1;
end
end
app.UITable.Data(RowstoDel,:)=[];
end

function LogoutButton_2Pushed(app, event)
close all
end

```

```

function LogoutButtonPushed(app, event)
close all
end

function Image2Clicked(app, event)
end

function Image3Clicked(app, event)
end

function SubmitButtonPushed(app, event)
%t=readtable("Book1.xlsx", "Sheet", 6);
nr={app.RegNoEditField.Value app.DatePicker.Value app.BatchEditField.Value
app.DepartmentEditField.Value app.SectionEditField.Value app.SubjectEditField.Value 1};
app.t=[app.t;nr];
writetable(app.t,"Book1.xlsx","Sheet",6);
msgbox('Added Succesfully','modal')
end
end

methods (Access = private)
1
function createComponents(app)

app.UIFigure = uifigure('Visible', 'off');
app.UIFigure.Position = [100 100 640 480];
app.UIFigure.Name = 'MATLAB App';

app.TabGroup = uitabgroup(app.UIFigure);
app.TabGroup.Position = [1 0 640 481];

app.View_Attendance = uitab(app.TabGroup);
app.View_Attendance.Title = 'View Attendance';
10
app.UITable = uitable(app.View_Attendance);
app.UITable.ColumnName = {'Column 1'; 'Column 2'; 'Column 3'; 'Column 4'};
app.UITable.RowName = {};
app.UITable.Position = [30 193 594 220];

app.ResetButton = uibutton(app.View_Attendance, 'push');
1
app.ResetButton.ButtonPushedFcn = createCallbackFcn(app, @ResetButtonPushed, true);
app.ResetButton.Position = [206 13 100 22];
app.ResetButton.Text = 'Reset';

app.RegNoEditFieldLabel = xlabel(app.View_Attendance);
app.RegNoEditFieldLabel.HorizontalAlignment = 'right';
app.RegNoEditFieldLabel.Position = [118 146 46 22];
app.RegNoEditFieldLabel.Text = 'Reg No';

```

```

app.RegNoEditField = uicontrol(app.View_Attendance, 'numeric');
app.RegNoEditField.Position = [179 146 154 22];

app.SearchButton = uicontrol(app.View_Attendance, 'push');
app.SearchButton.ButtonPushedFcn = createCallbackFcn(app, @SearchButtonPushed, true);
app.SearchButton.Position = [361 146 100 22];
app.SearchButton.Text = 'Search';

app.SubjectEditFieldLabel = uicontrol(app.View_Attendance);
app.SubjectEditFieldLabel.HorizontalAlignment = 'right';
app.SubjectEditFieldLabel.Position = [118 104 46 22];
app.SubjectEditFieldLabel.Text = 'Subject';

app.SubjectEditField = uicontrol(app.View_Attendance, 'text');
app.SubjectEditField.ValueChangedFcn = createCallbackFcn(app,
@SubjectEditFieldValueChanged, true);
app.SubjectEditField.Position = [182 104 152 22];

app.SearchButton_2 = uicontrol(app.View_Attendance, 'push');
app.SearchButton_2.ButtonPushedFcn = createCallbackFcn(app, @SearchButton_2Pushed,
true);
app.SearchButton_2.Position = [361 104 100 22];
app.SearchButton_2.Text = 'Search';

app.SearchButton_3 = uicontrol(app.View_Attendance, 'push');
app.SearchButton_3.ButtonPushedFcn = createCallbackFcn(app, @SearchButton_3Pushed,
true);
app.SearchButton_3.Position = [361 59 100 22];
app.SearchButton_3.Text = 'Search';

app.DatePickerLabel = uicontrol(app.View_Attendance);
app.DatePickerLabel.HorizontalAlignment = 'right';
app.DatePickerLabel.Position = [101 59 67 22];
app.DatePickerLabel.Text = 'Date Picker';

app.DatePicker = uicontrol(app.View_Attendance);
app.DatePicker.Position = [183 59 150 22];

app.LogoutButton_2 = uicontrol(app.View_Attendance, 'push');
app.LogoutButton_2.ButtonPushedFcn = createCallbackFcn(app, @LogoutButton_2Pushed,
true);
app.LogoutButton_2.Position = [332 13 100 22];
app.LogoutButton_2.Text = 'Logout';

app.Train_Database = uitab(app.TabGroup);
app.Train_Database.Title = 'Train Database';

app.UploadButton = uicontrol(app.Train_Database, 'push');
app.UploadButton.ButtonPushedFcn = createCallbackFcn(app, @UploadButtonPushed, true);
app.UploadButton.FontWeight = 'bold';

```

```

app.UploadButton.Position = [285 401 100 22];
app.UploadButton.Text = 'Upload';

app.TrainDatabaseButton = uibutton(app.Train_Database, 'push');
app.TrainDatabaseButton.ButtonPushedFcn = createCallbackFcn(app,
@TrainDatabaseButtonPushed, true);
app.TrainDatabaseButton.FontWeight = 'bold';
app.TrainDatabaseButton.Position = [449 104 102 22];
app.TrainDatabaseButton.Text = 'Train Database';

app.PleaseSelect10PicturesLabel = xlabel(app.Train_Database);
app.PleaseSelect10PicturesLabel.HorizontalAlignment = 'center';
app.PleaseSelect10PicturesLabel.FontSize = 16;
app.PleaseSelect10PicturesLabel.FontWeight = 'bold';
app.PleaseSelect10PicturesLabel.Position = [55 401 208 22];
app.PleaseSelect10PicturesLabel.Text = 'Please Select 10 Pictures :';

app.ClickthebelowbuttontotrainthetradatabaseLabel = xlabel(app.Train_Database);
app.ClickthebelowbuttontotrainthetradatabaseLabel.FontSize = 16;
app.ClickthebelowbuttontotrainthetradatabaseLabel.FontWeight = 'bold';
app.ClickthebelowbuttontotrainthetradatabaseLabel.Position = [69 104 352 22];
app.ClickthebelowbuttontotrainthetradatabaseLabel.Text = 'Click the below button to train the
database :';

app.LogoutButton = uibutton(app.Train_Database, 'push');
app.LogoutButton.ButtonPushedFcn = createCallbackFcn(app, @LogoutButtonPushed, true);
app.LogoutButton.Position = [262 38 100 22];
app.LogoutButton.Text = 'Logout';

app.Image = uiimage(app.Train_Database);
app.Image.Position = [30 277 100 100];

app.Image2 = uiimage(app.Train_Database);
app.Image2.ImageClickedFcn = createCallbackFcn(app, @Image2Clicked, true);
app.Image2.Position = [163 277 100 100];

app.Image3 = uiimage(app.Train_Database);
app.Image3.ImageClickedFcn = createCallbackFcn(app, @Image3Clicked, true);
app.Image3.Position = [285 277 100 100];

app.Image4 = uiimage(app.Train_Database);
app.Image4.Position = [409 277 100 100];

app.Image5 = uiimage(app.Train_Database);
app.Image5.Position = [524 277 100 100];

app.Image6 = uiimage(app.Train_Database);
app.Image6.Position = [30 158 100 100];

```

```

app.Image7 = uiimage(app.Train_Database);
app.Image7.Position = [163 158 100 100];

app.Image8 = uiimage(app.Train_Database);
app.Image8.Position = [285 158 100 100];

app.Image9 = uiimage(app.Train_Database);
app.Image9.Position = [409 158 100 100];

app.Image10 = uiimage(app.Train_Database);
app.Image10.Position = [524 158 100 100];

app.AddAttendanceTab = uitab(app.TabGroup);
app.AddAttendanceTab.Title = 'Add Attendance';

app.SubmitButton = uibutton(app.AddAttendanceTab, 'push');
app.SubmitButton.ButtonPushedFcn = createCallbackFcn(app, @SubmitButtonPushed, true);
app.SubmitButton.Position = [239 93 100 22];
app.SubmitButton.Text = 'Submit';

app.DatePicker_2Label = uilabel(app.AddAttendanceTab);
app.DatePicker_2Label.HorizontalAlignment = 'right';
app.DatePicker_2Label.Position = [180 158 67 22];
app.DatePicker_2Label.Text = 'Date Picker';

app.DatePicker_2 = uidepicker(app.AddAttendanceTab);
app.DatePicker_2.Position = [263 158 147 22];

app.SectionEditFieldLabel = uilabel(app.AddAttendanceTab);
app.SectionEditFieldLabel.HorizontalAlignment = 'right';
app.SectionEditFieldLabel.Position = [178 257 59 22];
app.SectionEditFieldLabel.Text = 'Section ';

app.SectionEditField = uieditfield(app.AddAttendanceTab, 'text');
app.SectionEditField.Position = [263 257 146 22];

app.DeparmentEditFieldLabel = uilabel(app.AddAttendanceTab);
app.DeparmentEditFieldLabel.HorizontalAlignment = 'right';
app.DeparmentEditFieldLabel.Position = [178 303 68 22];
app.DeparmentEditFieldLabel.Text = 'Deparment ';

app.DeparmentEditField = uieditfield(app.AddAttendanceTab, 'text');
app.DeparmentEditField.Position = [263 303 146 22];

app.BatchEditFieldLabel = uilabel(app.AddAttendanceTab);
app.BatchEditFieldLabel.HorizontalAlignment = 'right';
app.BatchEditFieldLabel.Position = [178 341 76 22];
app.BatchEditFieldLabel.Text = 'Batch ';

app.BatchEditField = uieditfield(app.AddAttendanceTab, 'numeric');

```

```

app.BatchEditField.Position = [263 341 146 22];

app.SubjectEditField_2Label = uilabel(app.AddAttendanceTab);
app.SubjectEditField_2Label.HorizontalAlignment = 'right';
app.SubjectEditField_2Label.Position = [178 206 46 22];
app.SubjectEditField_2Label.Text = 'Subject';

app.SubjectEditField_2 = uieditfield(app.AddAttendanceTab, 'text');
app.SubjectEditField_2.Position = [262 206 147 22];

app.RegNumberEditFieldLabel = uilabel(app.AddAttendanceTab);
app.RegNumberEditFieldLabel.HorizontalAlignment = 'right';
app.RegNumberEditFieldLabel.Position = [176 385 74 22];
app.RegNumberEditFieldLabel.Text = 'Reg Number';

app.RegNumberEditField = uieditfield(app.AddAttendanceTab, 'numeric');
app.RegNumberEditField.Position = [262 385 147 22];

app.UIFigure.Visible = 'on';
end
end

methods (Access = public)

function app = Admin

    createComponents(app)

    registerApp(app, app.UIFigure)

    if nargin == 0
        clear app
    end
end

function delete(app)

    delete(app.UIFigure)
end
end
end

```

The below code is for the user module

```

classdef User < matlab.apps.AppBase

```

```

properties (Access = public)
UIFigure matlab.ui.Figure
SubmitButton matlab.ui.control.Button
DatePickerLabel matlab.ui.control.Label
DatePicker matlab.ui.control.DatePicker
SectionLabel matlab.ui.control.Label
SectionEditField matlab.ui.control.EditField
DeparmentLabel matlab.ui.control.Label
DeparmentEditField matlab.ui.control.EditField
BatchLabel matlab.ui.control.Label
BatchEditField matlab.ui.control.NumericEditField
Image matlab.ui.control.Image
UITable matlab.ui.control.Table
ShowDataButton matlab.ui.control.Button
SubjectEditFieldLabel matlab.ui.control.Label
SubjectEditField matlab.ui.control.EditField
LogoutButton matlab.ui.control.Button
end

properties (Access = private)
y=readtable("Book1.xlsx","Sheet",6);
t=readtable("Book1.xlsx","Sheet",6);
end

methods (Access = private)

function ShowDataButtonPushed(app, event)
T=readtable("Book1.xlsx","Sheet",6);
app.UITable.Data =T;
app.UITable.ColumnName =T.Properties.VariableNames;
end

function SubmitButtonPushed(app, event)
clc;
faceDetector=vision.CascadeObjectDetector('FrontalFaceCART');
faceDetector.MergeThreshold=10;
%img=imread('4.png'); %Read input image
[filename, pathname]=uigetfile ('*.','Select the Input Grayscale Image') ;
filewithpath=strcat (pathname, filename);
img=imread(filewithpath);
%img=rgb2gray(img); % convert to gray
BB=step(faceDetector,img); % Detect faces
for i=1:size(BB,1)
BB(i,1)=BB(i,1)-20;
BB(i,2)=BB(i,2)-20;
BB(i,3)=BB(i,3)+40;
BB(i,4)=BB(i,4)+40;
end
iimg = insertObjectAnnotation(img, 'rectangle', BB, 'Face '); %Annotate detected faces.

```

```

%figure(1);
%imshow(iimg);
%title('Detected face');
app.Image.ImageSource=iimg;

hold on
for i=1:size(BB,1)
rectangle('position',BB(i,:), 'Linewidth',2, 'LineStyle','-', 'Edgecolor','y');
end
hold on
N=size(BB,1);
handles.N=N;
counter=1;
x=0;
for j=1:N
face=imcrop(img,BB(j,:));
savenam = strcat('S:\Pro\Pro\TrainDB\',num2str(counter), '.jpg');
baseDir = 'S:\Pro\Pro\TrainDB\TestDB\';
newName = [baseDir num2str(j) '.jpg'];
handles.face=face;
fac=imresize(face,[112,92]);
imwrite(fac,newName);
%figure(1);
%imshow(face);
x=x+1;
%title('crop pic');
%pause(.5);
end
load pcadb17;
%pcaob loads followings in workspace
%Image size (M=100, N=90)
%Mean Image [m]
%Reduced Eigen vectors transformation matrix (Ppca)
%Transformed dataset matrix [T]
for j=1:x
baseDir = 'S:\Pro\Pro\TrainDB\TestDB\';
newName = [baseDir num2str(j) '.jpg'];
img=imread(newName);
imgo=img;
img=rgb2gray(img);
img=imresize(img, [M,N]);
img=double (reshape (img, [1,M*N]));
imgpca=(img-m)*Ppca; %SProjecting query image to PCA space
distarray=zeros (n,1); %Initialize difference array
for i=1:n
distarray(i)=sum (abs (T(i,:)-imgpca)); %Einding Li distance
end
[result,indx]=min(distarray); %Getting best match
resultimg=imread (sprintf('%d.jpg', indx)); %SGetting best matched image
c=ceil(indx/10);

```

```

%Plotting Images
subplot(121)
imshow(imgo);
title('Query Image');
subplot(122)
imshow(resultimg);
title(['Roll No: ',num2str(c)]);
%disp(['Roll No: ',num2str(c)]);
nr=(c app.DatePicker.Value app.BatchEditField.Value app.DepartmentEditField.Value
app.SectionEditField.Value app.SubjectEditField.Value 1);
app.UITable.ColumnName =app.t.Properties.VariableNames;
if(i>2)
app.UITable.Data=[app.t;nr];
else
app.UITable.Data=nr;
end
app.t=app.UITable.Data;
pause(2.5);
%1 2 5 7 10 11 13 14 16
end
%app.t=[app.t;app.y];
writetable(app.t,"Book1.xlsx","Sheet",6);
end

```

```

function LogoutButtonPushed(app, event)
close User
end

```

```

function ImageClicked(app, event)
end
end

```

```

methods (Access = private)

```

```

function createComponents(app)

```

```

app.UIFigure = uifigure('Visible', 'off');
app.UIFigure.Position = [100 100 911 553];
app.UIFigure.Name = 'MATLAB App';

```

```

app.SubmitButton = uibutton(app.UIFigure, 'push');
app.SubmitButton.ButtonPushedFcn = createCallbackFcn(app, @SubmitButtonPushed, true);
app.SubmitButton.Position = [172 278 100 22];
app.SubmitButton.Text = 'Submit';

```

```

app.DatePickerLabel = _____;
app.DatePickerLabel.____ = _____;
app.DatePickerLabel.____ = [114 332 67];
app.DatePickerLabel.____ = 'Date Picker';

```

```

app.DatePicker = uidepicker(app.UIFigure);
app.DatePicker.Position = [197 332 147 22];

app.SectionLabel = uilabel(app.UIFigure);
app.SectionLabel.HorizontalAlignment = 'right';
app.SectionLabel.Position = [112 431 59 22];
app.SectionLabel.Text = 'Section ';

app.SectionEditField = uieditfield(app.UIFigure, 'text');
app.SectionEditField.Position = [197 431 146 22];

app.DepartmentLabel = uilabel(app.UIFigure);
app.DepartmentLabel.HorizontalAlignment = 'right';
app.DepartmentLabel.Position = [112 477 68 22];
app.DepartmentLabel.Text = 'Department ';
app.DepartmentEditField = uieditfield(app.UIFigure, 'text');
app.DepartmentEditField.Position = [197 477 146 22];
app.BatchLabel = uilabel(app.UIFigure);
app.BatchLabel.HorizontalAlignment = 'right';
app.BatchLabel.Position = [112 515 76 22];
app.BatchLabel.Text = 'Batch ';
app.BatchEditField = uieditfield(app.UIFigure, 'numeric');
app.BatchEditField.Position = [197 515 146 22];
app.Image = uiimage(app.UIFigure);
app.Image.ImageClickedFcn = createCallbackFcn(app, @ImageClicked, true);
app.Image.Position = [507 297 284 219];
app.UITable = uitable(app.UIFigure);
app.UITable.ColumnName = {'Column 1'; 'Column 2'; 'Column 3'; 'Column 4'};
app.UITable.RowName = {};
app.UITable.Position = [31 62 852 185];
app.ShowDataButton = uibutton(app.UIFigure, 'push');
app.ShowDataButton.ButtonPushedFcn = createCallbackFcn(app,
@ShowDataButtonPushed, true);
app.ShowDataButton.Position = [376 21 100 22];
app.ShowDataButton.Text = 'Show Data';
app.SubjectEditFieldLabel = uilabel(app.UIFigure);
app.SubjectEditFieldLabel.HorizontalAlignment = 'right';
app.SubjectEditFieldLabel.Position = [112 380 46 22];
app.SubjectEditFieldLabel.Text = 'Subject';
app.SubjectEditField = uieditfield(app.UIFigure, 'text');
app.SubjectEditField.Position = [196 380 147 22];
app.LogoutButton = uibutton(app.UIFigure, 'push');
app.LogoutButton.ButtonPushedFcn = createCallbackFcn(app, @LogoutButtonPushed,
true);
app.LogoutButton.Position = [551 21 100 22];
app.LogoutButton.Text = 'Logout';
app.UIFigure.Visible = 'on';
end
end

```

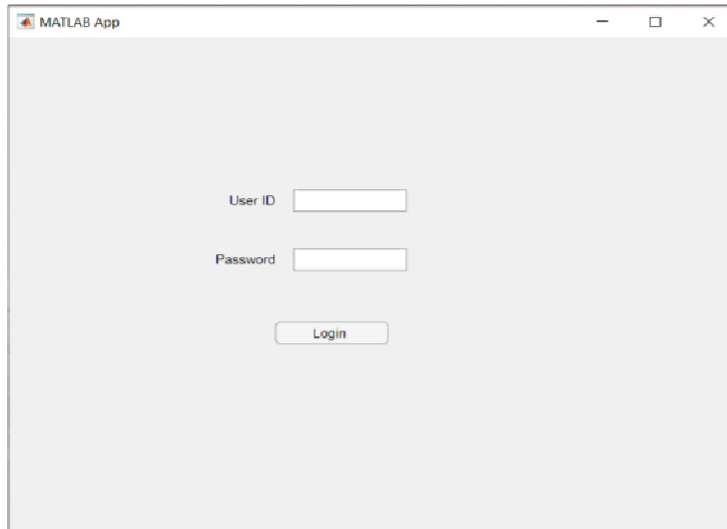
```
methods (Access = public)
    function app = User
        createComponents(app)
        registerApp(app, app.UIFigure)
        if nargin == 0
            clear app
        end
    end
end

function delete(app)

    delete(app.UIFigure)
end
end
end
```

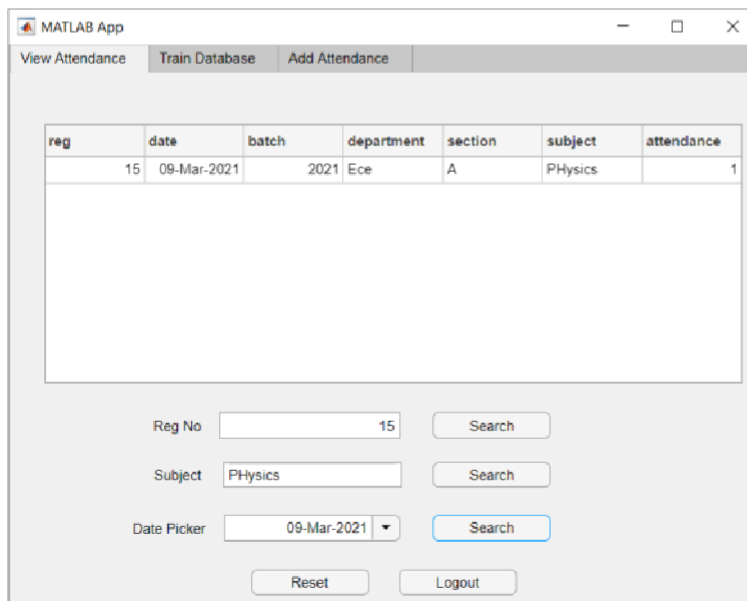
CHAPTER 5

RESULT AND DISCUSSION



A screenshot of a MATLAB App window titled "MATLAB App". The app has a light gray background. In the center, there are two text input fields. The first is labeled "User ID" and the second is labeled "Password". Below these fields is a "Login" button.

This slide is used to login into the attendance system i.e User and admin can login through login credentials.

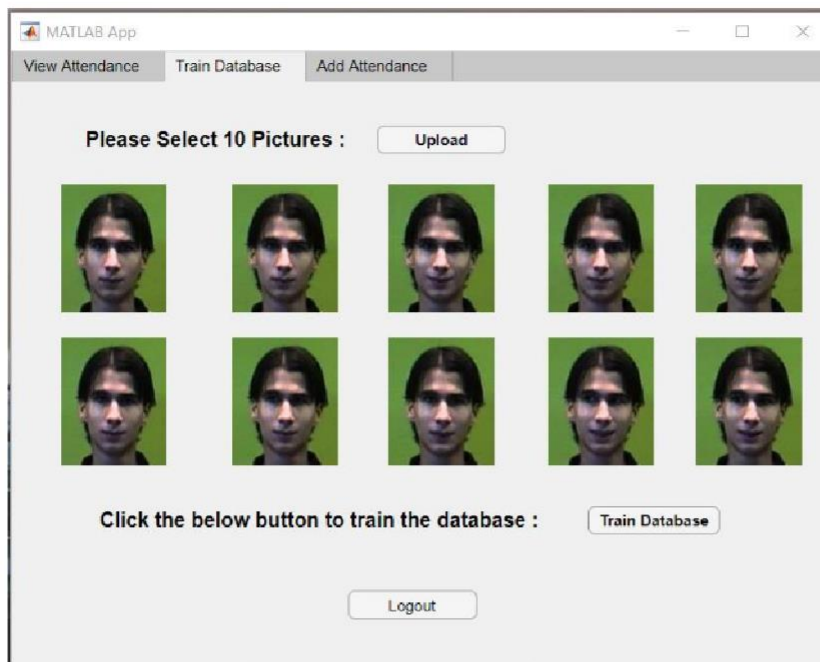


A screenshot of a MATLAB App window titled "MATLAB App". The app has a light gray background. At the top, there are three tabs: "View Attendance", "Train Database", and "Add Attendance". The "View Attendance" tab is selected. Below the tabs is a table with the following data:

reg	date	batch	department	section	subject	attendance
15	09-Mar-2021	2021	Ece	A	PHysics	1

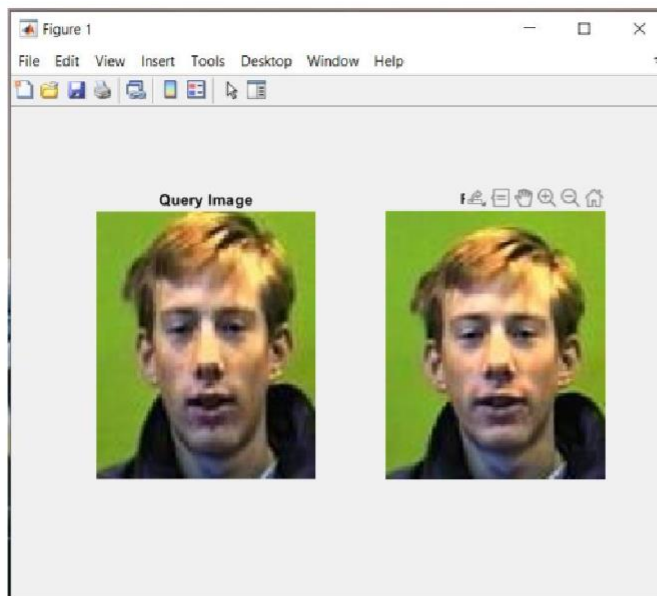
Below the table, there are three search filters: "Reg No" with a text input field containing "15", "Subject" with a text input field containing "PHysics", and "Date Picker" with a dropdown menu showing "09-Mar-2021". Each filter has a "Search" button. At the bottom, there are "Reset" and "Logout" buttons.

In this slide admin can check the attendance through Filter the register number, Date and subject.



In this slide admin can upload the photos of student for training the database.

In this slide admin can upload the attendance manual when the student is not present in the photo.



In this slide the program will match the faces in the photo with the faces database.

The image shows a MATLAB App window. It contains a form with the following fields:

- Batch: 2021
- Department: ECE
- Section: A
- Subject: Physics
- Date Picker: 12-Mar-2021

Below the form is a 'Submit' button. To the right of the form is a grid of 12 small face images. Below the form is a table with the following data:

reg	date	batch	department	section	subject	attendance
17	12-Mar-2021	2021	ECE	A	Physics	1
4	12-Mar-2021	2021	ECE	A	Physics	1
15	12-Mar-2021	2021	ECE	A	Physics	1
13	12-Mar-2021	2021	ECE	A	Physics	1
3	12-Mar-2021	2021	ECE	A	Physics	1
7	12-Mar-2021	2021	ECE	A	Physics	1
11	12-Mar-2021	2021	ECE	A	Physics	1

Below the table are two buttons: 'Show Data' and 'Logout'.

In this slide user can upload the group photo and then the program will crop the face and match the faces with the database.

CHAPTER 6

SUMMARY AND CONCLUSIONS

The complete system is implemented in MATLAB with the help of various inbuilt toolboxes. We have implemented this project algorithm on MATLAB 2020a version. This is a complete attendance system with facial recognition techniques and attendance administration system. We have implemented the project according to the proposed block diagram.

REFERENCES

- 1) "Facial parts detection using Viola Jones algorithm." Vikram, K., and S. Padmavathi, Advanced Computing and Communication Systems (ICACCS), 2017
- 2) Automated Attendance System Using Face Recognition, Khan Suhel, Zakariya Hussain, Khan Shueb, April 2016.
- 3) Face detection and recognition for automatic attendance system, Dr. Nita Thakare¹, Meghna Shrivastava², Nidhi Kumari³, International Journal of Computer Science and Mobile Computing, Vol.5 Issue.4, April- 2016

ORIGINALITY REPORT

15%

SIMILARITY INDEX

14%

INTERNET SOURCES

2%

PUBLICATIONS

8%

STUDENT PAPERS

PRIMARY SOURCES

1

programmerworld.co

Internet Source

3%

2

www.coursehero.com

Internet Source

3%

3

Submitted to Middle East Technical University

Student Paper

2%

4

Submitted to University of Nottingham

Student Paper

1%

5

www.mathworks.com

Internet Source

1%

6

www.instructables.com

Internet Source

1%

7

Submitted to Bilkent University

Student Paper

1%

8

Submitted to Central Queensland University

Student Paper

1%

9

Submitted to Abdullah Gul University

Student Paper

1%

10	la.mathworks.com Internet Source	<1 %
11	dokumen.pub Internet Source	<1 %
12	www.slideshare.net Internet Source	<1 %
13	www.ijcsmc.com Internet Source	<1 %
14	"Advances in Smart Grid and Renewable Energy", Springer Science and Business Media LLC, 2021 Publication	<1 %
15	Submitted to Asia Pacific University College of Technology and Innovation (UCTI) Student Paper	<1 %
16	www.ijircce.com Internet Source	<1 %
17	ela.kpi.ua Internet Source	<1 %
18	iopscience.iop.org Internet Source	<1 %
19	kr.mathworks.com Internet Source	<1 %
20	K. Vikram, S. Padmavathi. "Facial parts detection using Viola Jones algorithm", 2017	<1 %

4th International Conference on Advanced Computing and Communication Systems (ICACCS), 2017

Publication

21

gist.github.com

Internet Source

<1 %

22

www.amrita.edu

Internet Source

<1 %

Exclude quotes Off

Exclude matches Off

Exclude bibliography Off

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13

PAGE 14

PAGE 15

PAGE 16

PAGE 17

PAGE 18

PAGE 19

PAGE 20

PAGE 21

PAGE 22

PAGE 23

PAGE 24

PAGE 25

PAGE 26

PAGE 27

PAGE 28

PAGE 29

PAGE 30

PAGE 31

PAGE 32

PAGE 33

PAGE 34

PAGE 35

PAGE 36

PAGE 37

PAGE 38

PAGE 39

PAGE 40

PAGE 41

PAGE 42

PAGE 43

PAGE 44

PAGE 45

PAGE 46

PAGE 47

PAGE 48

PAGE 49

PAGE 50

PAGE 51

PAGE 52

PAGE 53

PAGE 54

PAGE 55

PAGE 56

PAGE 57

PAGE 58

PAGE 59

PAGE 60
