FACE DETECTION

A PROJECT REPORT

Submitted by

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C E R T I F I C A T E

D A T E : _ / _ / _ _

This is to certify that the dissertation entitled “FACE DETECTION” has been carried out by Dhruv Rajpurohit under my guidance in fulfilment of the degree of Bachelor of Engineering in **INFORMATION TECHNOLOGY** (8 Semester) of Gujarat Technological University, Ahmedabad during the academic year 2017-18

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I would like to thank our H.O.D Mrs. Archana Patel and Mr. Jaydip Kanani (Internal Guide) for constantly guiding and showing us the correct path to reach towards our desired goal. Also I thank them for sharing their experience, knowledge and valuable time with me and showing their concern in my project to make it better.

I also thank all the other faculties who directly or indirectly supported me in making my project successful by sharing their ideas and knowledge.

At last, I would like to thank our parents and friends who have directly or indirectly helped us in making the project work successful.

NAME: **SIGNATURE:**

Dhruv Rajpurohit (141130116078)

Abstract

Computer Vision is mimicking the abilities of human vision by electronically perceiving and understanding an image. It is a broad term and includes a lot of domains like Gesture Recognition, Optical Character Recognition, Face detection and a lot more. In this system, we will be focussing on face detection and try to understand the key ideas that allow us to detect human faces in real time.

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CHAPTER-1 INTRODUCTION

1.1 PROJECT DETAIL

This project is based on face detection which is sub-part of computer vision and it is used to mark the attendance of the user with current time and date using face recognition.

It is the process of identifying one or more people in images or videos by analyzing and comparing patterns. Algorithms for face recognition typically extract facial features and compare them to a database to find the best match.

The aim of this system is to give solution regarding problems like 5-10 mins is wasted for taking attendance, Statistical data is hard to compute and analyse. Also, there is a chance of false attendance and proxy. With the proposed solution, above all problems can be eradicated.

1.2 PROJECT PURPOSE

The purpose of this document is to provide a detailed overview of our software product, its parameters and goals. This document describes the project's target audience and its user interface, hardware and software requirements. It defines how our client, team and audience see the product and its functionality. Nonetheless, it helps any designer and developer to assist in software development lifecycle (SDLC) processes.

This SRS aims to provide the detail description on the client requirements through application.

1.3 PROJECT SCOPE

This is an Attendance Management system using Face Detection and Recognition which uses Color Moment Algorithm and it allows user to add his/her attendance in the system with current date and time parameters as well gives special features for the admin to manage all the records in the excel file and carry out analytics from it as well delete a particular user from the system and adding of a new user in the system.

1.3.1 PROJECT FEATURES

This application will provide following features*:-*

- Usage of Color Moment Algorithm.
- Create and Train the Dataset, one time only.
- Detect and crop the faces in an input image file.
- Recognize faces and modify the attendance in the excel sheet.
- Reliable to use.
- Easy to use and simple UI.
- Attendance Management using Face Detection.

1.4 PROJECT OBJECTIVES

The main objective of this system is to eradicate all the problems that current system has as well as give solutions to the problems already present in the main domain, some of the best possible solutions until now…

- RFID Scanner which is costlier when it comes to setup or installation cost as well as people can use other peoples card`s to mark their attendance also waiting time is large enough.
- Fingerprint System and it`s problem is that the template takes a lot of space for some specific value we will consider it as 240 kb which is a high value when it comes to a large company`s database, sometimes it becomes inefficient because of the smudges on the fingers as well as based on us poll results people do feel a bit of inferiority complex when it comes to fingerprint system.
- Last is our proposed system which uses Face Detection for Attendance Management.

1.5 TECHNOLOGY AND LITERATURE REVIEW

1.5.1 TECHNOLOGY REVIEW (ALL THE TECHNOLOGIES USED IN OUR SYSTEM)

The first efficient face detection algorithm which was used in practical application was **Viola-Jones Algorithm** back in 2001, and it was developed by Paul Viola and Michael Jones. Their Demo showed people about how faces were detected in real-time on a live camera or a webcam feed.

Here we can say that a new branched emerged in the field of computer science which was named Computer Vision (CV), also more amount of people started giving their time and applied skills to develop much faster and better algorithms to detect faces. Though there work was very much appreciated but later as it was a failure it was never used again, the reason for it was that all the features of the human face were hardcoded and were static, so if the linear orientation of the face changed by some parameters it was not able to detect it, let`s say if an image was captured in an vertical orientation that if the orientation was changed by some values than it lead to a failure in detection.

HOG ALGORITHM:

Histograms of Oriented Gradient (Hog) which was invented by Navneet Dalal and Bill Triggs, their feature descriptor, significantly outperformed existing algorithms in this task, which was handcoded features, just like before. For every single pixel, we want to look at the pixels that directly run surrounding it. Here the goal was to locate how dark is current pixel compared to surrounding pixels, we then draw an arrow showing in which direction the image is getting darker and they repeated that process for every single pixel in the image, and every pixel is replaced by an arrow. These arrows are called gradients, they show the flow from light to dark across the entire image. Lastly, they divided each pixel into small squares of 16x16 pixels each and counted up the major number of errors in the box, which then resulted the end image into a simple representation that captures basic structure of a face in simple way.

TENSORFLOW OBJECT DETECTION API:

Creating accurate machine learning models capable of localizing and identifying multiple objects in a single image remains a core challenge in computer vision. The TensorFlow Object Detection API is an open source framework built on top of TensorFlow that makes it easy to construct, train and deploy object detection models. At Google we've certainly found this codebase to be useful for our computer vision needs, and we hope that you will as well.

Tensorflow Object Detection API depends on the following libraries:

- Protobuf 2.6
- Python-tk
- Pillow 1.0
- lxml
- tf Slim (which is included in the "tensorflow/models/research/" checkout)
- Jupyter notebook
- Matplotlib
- Tensorflow
- Cython
- cocoapi

COCO API INSTALLATION

```
        git clone https://github.com/cocodataset/cocoapi.git
cd cocoapi/PythonAPI
make
cp -r pycocotools <path_to_tensorflow>/models/research/
```

PROTOBUF COMPILATION

```
# From tensorflow/models/research/
protoc object_detection/protos/*.proto --python_out=.
```

TESTING THE INSTALLATION

```
python object_detection/builders/model_builder_test.py
```

The main disadvantage of Object Detection Api was that it was able to find particular person from the frame of an image but as in our system that was not enough since we needed a system which was able to detect as well as recognize the same person to mark his/her attendance, it was able to detect multiple people in the same time frame but was only able to detect them and whenever new people emerged in the system they were just shown as a person in a particular

frame, so we needed to move on to some other algorithm or a system which was able to detect as well as recognize the person whether he/she already existed in the database or not and mark their respective attendance for the day.

Here comes our system which is **Real Time Face Recognition Attendance Management System using MATLAB,** this is the project that uses any USB Webcam or Laptop Webcam and it is a GUI based application which automatically identifies a previously registered face and matches it with the database that is being created. It also marks the attendance on the Notepad and if you want it in the Excel file than you can simply use any of the below two suggested methods which are …

- You can change the file extension in the **build.database** file which will be attendance_sheet.txt which you can change to .xlsx
- Other option is that you can go to Excel and insert the data of a notepad file in it and further carry out operations in it.

CHAPTER-2 PROJECT MANAGEMENT

2.1 FEASIBILITY STUDY

Feasibility is a practical extent to which a project can be performed successfully. To evaluate feasibility, a feasibility study is performed, which determines whether the solution considered to accomplish the requirements is practical and workable in the software or not. Such information as resource availability, cost estimate for software development, benefits of the software to organization, and cost to be incurred on its maintenance are considered. The objective of the feasibility study is to establish the reasons for developing software that is acceptable to users and adaptable to change.

A feasibility study is a short, focused study, which aims to answer a number of questions:

- Does the system contribute to the overall objectives of the organization?
- Can the system be implemented using current technology and within given cost and schedule constraints?
- Can the system be integrated with systems which are already in place?
- Operational Feasibility
- Technical Feasibility
- Scheduling Feasibility
- Economic Feasibility
- Implementation Feasibility

Now each of them is explained briefly, as below.

2.1.1 OPERATIONAL FEASIBILITY STUDY

The main purpose of checking Operational Feasibility is to find out whether the system will be functional after its development and installation or not. The outcomes of the operational feasibility are as follows:

- User can mark the attendance easily.
- It eliminates the limitation of existing system
- Hence this application is operationally feasible.

2.1.2 TECHNICAL FEASIBILITY

The main purpose of checking Technical Feasibility is to examine whether the current technology is sufficient for the development of the system. The outcomes of the technical feasibility are as follows:

- Major part of coding is done in MATLAB.
- For back end we have used Excel or a Simple text file.
- It provides faster response to its users. It is accurate, reliable and easy to use.
- Hence this application is technically feasible.

2.1.3 TIME SCHEDULE FEASIBILITY

A project will fail if it takes too long to be completed before it is useful. Typically this means estimating how long the system will take to develop, and if it can be completed in a given time period using some methods like payback period. Given our technical expertise, are the project deadlines reasonable? Some projects are initiated with specific deadlines. You need to determine whether the deadlines are mandatory or desirable.

2.1.4 ECONOMICAL FEASIBILITY

Economic analysis could also be referred to as cost/benefit analysis. It is the most frequently used method for evaluating the effectiveness of a new system. In economic analysis the procedure is to determine the benefits and savings that are expected from a candidate system and compare them with costs. If the expected benefits equal or exceed costs, the system can be judged to be economically feasible. Economic analysis is used for evaluating the effectiveness of the proposed system.

The economic feasibility will review the expected costs to see if they are in-line with the projected budget or if the project has an acceptable return on investment. At this point, the projected costs will only be a rough estimate. A rough estimate of the project schedule is required to determine if it would be feasible to complete the systems project within a required timeframe. The required timeframe would need to be set by the organization.

2.1.5 IMPLEMENTATION FEASIBILITY

The main purpose of checking Operational Feasibility is to find out whether the system will be functional after its development and installation or not. The outcomes of the operational feasibility are as follows:

- Proposed system will be able to use Face Detection to detect the faces and store them in the dataset of images and later it will recognise them based on training the given data and will mark their attendance with respective time and date.

2.2 PROJECT PLANNING

Project Planning is an aspect of Project Management that focuses a lot on Project Integration. The project plan reflects the current status of all project activities and is used to monitor and control the project.

The Project Planning tasks ensure that various elements of the Project are coordinated and therefore guide the project execution. Project Planning helps in

- Monitoring/measuring the project progress, and
- Facilitating communication
- Provides overall documentation of assumptions/planning decisions

The Project Planning Phases can be broadly classified as follows:

- Development of the Project Plan
- Execution of the Project Plan

2.2.1 PROJECT DEVELOPMENT APPROACH AND JUSTIFICATION

Agile Software Development

Agility refers to the quality of being agile. Internet software industry and Mobile and wireless application development industry are looking for a very good approach of software development. Conventional software development methods have completely closed the requirements process before analysis and design process. As this approach is not always feasible and compatible with all others projects. In contrast to the conventional approaches, agile methods allow developers to make late changes in the requirement specification document.

- The focus of the Agile software development as given by "Agile Software Development Manifesto" is presented in the following: Individuals and interactions over processes and tools Working software over comprehensive documentation.

Fig: 2.2.1 Agile Software Development

AGILE METHODS

Agile methods are designed to produce the first delivery in weeks, to achieve and early win and rapid feedback. These methods invent simple answers so that change can be less.

These also improve design issues and quality as they are based on iteratively incremental method.

- What makes a method an Agile? When the process are:

  a) Incremental: Small releases with rapid iterations

  b) Cooperative: Customer and developer relationships

  c) Straight: The method which is easy to learn and modify with documentation

  d) Adaptive: Able to embrace changes instantly

- Different Agile Software Development methods

  1) Extreme programming

  2) Scrum

  3) Feature driven development

The life cycle of Extreme programming consists of five phases

a) Exploration

b) Planning

c) Iteration on releases

d) Product ionizing

e) Maintenance

f) Death

Extreme programming is a light weight software methodology for a small to medium sized teams developing software in the rapidly changing requirements situation. XP matches the behaviour of successful programmers in the wild

- Tests
- Refactoring
- Evolutionary delivery
- Incremental planning
- Less overhead

SCRUM:

The term “SCRUM “ originally derives from a strategy in the game of rugby where it denotes “getting an out of play ball back into the game” with teamwork. Scrum concentrates on how the team members should function in order to produce the system flexibly in a constantly changing environment. Scrum is extremely simple model used by different software companies from long time, which works with existing engineering practices and is scalable and work with common sense which is to say it is very easy.

Scrum process includes three phases

1. Pre-game

2. Development

3. Post-game

1. Pre-game phase includes two sub-phases

Planning and Architecture design

- Planning phase: includes the development of the required system. A Backlog list is created, which contains all the requirements that are known at that moment. In every iteration the Back log list is updated by scrum team to gain commitment for the next iteration.
- Architecture phase: In this phase an abstract view of the model is designed by viewing Backlog list.

2. The Development phase:

This phase takes care of the different variable like time frame, quality, requirements, recourses, technologies and tools. Sprints are the iterative cycles where functionality is developed or enhanced to produce new increments. Each Sprint includes the traditional phases of software engineering.

- Requirement
- Analyses
- Designs
- Evolution and delivery

3. The Post-game phase close to release.

- Roles in Scrum
- SCRUM master
- Product owner
- Scrum Team
- Customer

Feature Driven Development

FDD is agile approach for software development systems. It provides enough structure for large items, emphasis on quality and working software, delivers frequent, tangible results.

Five phases of FDD

- Develop a overall model
- Build a features list
- Plan by feature
- Design by feature
- Build by feature

CONCLUSIONS:

As we came to know that traditional software development approaches are more mechanistic which concentrate more on Processes, tools, contracts and plans. In contrast to traditional methods, agile methods keep emphasis on interaction, working software, embracing change at any moment of the project, customer relationships. The method can be agile if it is:

- Incremental
- Cooperative
- Straightforward

"Agile view is more people centric rather than plan-centric."

Agile methods are not defined by a small set of principles, practices and techniques. It creates a strategic capability which has capability of responding to change, capability to balance the structure and flexibility, capability of innovation and creations through development team and uncertainty.

- Scrum
- FDD (Feature driven development)
- DSDM (Dynamic systems development method)

2.2.2 PROJECT PLAN

Project planning is basically concerned with identifying and measuring activities, milestones and deliverables produced by project. Thus in this section I cover following:-

Estimating some basic attributes of the project

a) Duration: How long will it take to complete the development?

The project that we have taken contains functionalities which are very complex for an undergraduate. We need to do a detailed research of what combination of technologies would be best for the project, get acclimatized to them, do the rest of the planning and go ahead with the work. Hence the duration of the Project can be roughly estimated to 10 months.

b) Efforts: How much efforts would be required?

Since it is a one-person group and as it is a very hazy picture ahead of how to go about the project, figuring that out and considering the pros and cons would take up a lot of effort in itself. Thus, efforts can be estimated to 3 hours of weekdays work for 10 months

2.2.3 MILESTONES AND DELIVERABLES

Management needs information. As software is intangible, this information can only be provided as documents that describe the state of the software being developed. Without this information, it is impossible to judge progress and cost estimates and schedules cannot be updated. When planning a project series of milestones are established.

Sr. No	Activities
1.	Study of available system
2.	Prior tools study
3.	Project Synopsis
4.	Requirement Gathering
5.	Analysis Iteration-1
6.	Analysis Iteration-2
7.	Prototype
8.	Data Dictionary
9.	UML Diagrams
10.	Designing
11.	Coding

Table 2.2.3

The team members are responsible for all documentation to be developed and for all work to be done. I am grateful to my internal guide for his dedication in our project development; without him it would be tough for me to even take up this project.

2.2.4 GROUP DEPENDENCIES

Team structure is as follows:-

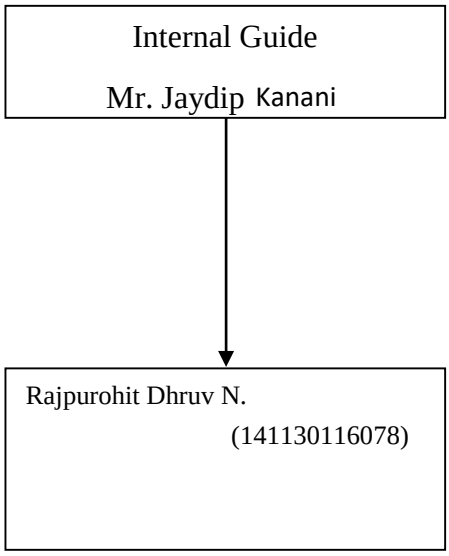


Fig: 2.2.3 Group Dependencies Figure

2.3 PROJECT SCHEDULING

Scheduling of a software project does not differ greatly from scheduling of any multitask engineering effort. Therefore, generalized project scheduling tools and techniques can be applied with little modification to software projects.

Project scheduling consists of identifying the tasks needed to complete the project, determine the dependency tasks, among different plan the starting and ending dates for various tasks and determine the chain of tasks that determine the duration of the project.

CHAPTER-3 SYSTEM REQUIREMENT STUDY

3.1 STUDY OF CURRENT SYSTEM

Any organization which requires or needs to deal with the attendance management would probably go through a lot of serious stages in solving the particular problem efficiently and without any hasel.

3.2 PROBLEM AND WEAKNESS OF CURRENT SYSTEM

Okay so till now if you will observe the system works fine in dealing with the actual or main central issue which was to handle the attendance of multiple users and detecting their faces but the problem is as my laptop has a 720p camera it has certain limitations like it needs adequate lighting conditions moreover requires more amount of time in focusing on a moving face, but all the problems which are mentioned above can be solved using certain techniques or objects which I will be discussing in the later stage of documentation.

3.3 USER CHARACTERISTICS

Each System has various types of users. Some have all the permissions to the access all the system features while some others has a subset of all the permissions. In this system the Users' roles and permissions need to be specified very specifically and each role must be given only that set of permissions which their role is defined for

- **Admin**

Admin is the user who has the highest level of superiority and is able to add a particular person to the dataset as well as remove him and train the dataset for further endeavours. Moreover, all the data can be structured in an excel file to carry out further analysis on the recorded data.

- **User**

User can mark his or her attendance using their registered face.

3.4 HARDWARE AND SOFTWARE REQUIREMENTS

Hardware Requirement

- 1 GHz processor ARMv7
- Any operating system
- Minimum 512 MB RAM
- Minimum 100 MB Internal storage space

Software Requirement

- Matlab as well as Simulink
- Communications System Toolbox
- Database Connection Toolbox

3.5 CONSTRAINTS

3.5.1. REGULATORY POLICIES

As all the documents are confidential they will be only available to me only. Documents will be uploaded by the Administrator only.

3.5.2 INTERFACES TO OTHER APPLICATIONS

Any organization needs to carry out there attendance on daily basis, so it will be used on a day to day basis.

3.5.3. PARALLEL OPERATIONS

At a time User can mark his or her attendance using their face as well as Admin can add a particular person into the image dataset and name that particular person and to which department he belongs and also train the model so that the errors as well as detection rate or you can say success rate can be improved in later state of process, moreover in a company if data analyst is present than he or she will be able to predict certain trends out of the data and will be able to give quiet interesting facts.

3.5.4. HIGHER ORDER LANGUAGE REQUIREMENTS

The project requires Matlab Software which doesn`t come for free, though I somehow managed to get a free version of it for carrying out the work which was required in my project. Moreover, compared to any other language Matlab is considered as an Interpreter also has a huge standard library and is sometimes also used for building up the GUI.

3.5.5 SAFETY AND SECURITY CONSIDERATION

Without proper authentication unauthorized users will be unable to alter the database.

For e.g.: without administrator password no one will be able to create or delete the workspace once allocated and user will be unable to updating of records.

Unauthorized access, revelation, or destruction of data can violate individual privacy. Corruption of business data can result in significant and potentially catastrophic losses to companies.

In this software, security threats are at user level as well as on data level.

1. **User Level Security:-**

Only authorized user can access this S/W. And even if some intruder or false person tries to enter the system, it will automatically detect them and will be able to respond as in a informative feedback.

2. **Data Level Security:-**

Data level security provided in back end. Database Toolbox provides functions and an app for working with relational databases. It includes support for nonrelational databases, and provides a native SQLite database. You can access data via SQL commands or the explorer app.

CHAPTER-4 REQUIREMENT OF PROPOSED SYSTEM

4.1 Main Module of the System

There are in all 6 modules in this system which are Adding of an Image, Delete Function, Training Function, Matching Function, Reset Function and the Database.

4.1.1 INTRODUCTION

The User selling point of my project is that first of all working with face detection and recognition really is lot of fun and a whole lot of new things to learn moreover it has many practical uses like in domains of Security, Marketing, HealthCare and here we have used it for an Attendance Management System considering the given time frame and resources.

4.1.2 FUNCTIONALITY OF FACE DETECTION

- Administrator can use the Reset Function.
- Which includes functions like resetting Attendance sheet, Database, features file as well as Info file.
- You can view the attendance database as well as image dataset which is used for training purpose for later stages.
- Matching or we can say the main function which tracks or recognizes you based on your face.
- Training function which will train the dataset, if a new image is added.
- Lastly, adding and deleting a new image in and from database.

4.1.3 REQUIREMENT OF FACE DETECTION

- There were many inventions laid out before this system but as they were not successful idea of face detection comes into play.
- First was the traditional system in which 5-10 min is wasted for taking attendance. Moreover, Statistical data is hard to analyse.
- Second was the RFID system which was costly and at the same time there was a chance of false attendance and waiting time was large.
- Third was the Fingerprint system which was costly as well as it would take a whole lot of space (240 KB).

4.1.4 MAJOR COMPONENTS OF FACE DETECTION

There are three major components are:

- Creating the Image Dataset.
- Training the Dataset.
- Matching the person.

4.1.5 DESCRIPTIVE DATA

- **Group Admin**

  Admin is a user who has rights to add or remove any member from the group and is able to perform a whole bunch of activities like resetting the database, the Info file, features file as well as the database.

- **User**

  User can mark their attendance using their pre-registered face with accurate time and date and the status.

4.2 MODULE DESCRIPTION

Add New Image:

- To access the application the users have to first add their image into the dataset and register using their Id and Name.

Delete:

- Using this function admin can delete multiple pictures of users using image id.
- Can view the whole database and select them manually to view a particular image and delete it.
- Also, a particular attendance can be deleted if it is not valid using the delete function.

Training:

- It is the second main functionality as every time a new image is added, training is required to be done which will help the model extract features from the images and label them with the help of Image database, moreover we have an advantage over the other system because as training is required only once we will be able to save a lot of resources and computing power.

Matching:

- User can mark their attendance using this function and the process behind it is as follows:-
- First, user needs to stand in front of camera and wait for the webcam to detect his face frame in the picture, this might take some time.
- After the image is taken into consideration, it will show two frames in which current photo captured will be shown and in the other frame the image will be shown on which the system predicted that the image matches with the person`s current image captured.

4.3 FEATURES OF NEW SYSTEM

Here are some features which are great when compared to other such system or you can say this are the particular answers for the value propositions or key features of the system.

- Usage of Color Moment Algorithm.
- Create and Train the dataset, one time only.
- Detect and Crop the Faces in an Input Image.
- Recognize Faces and Modify the Attendance in the Excel Sheet.
- Reliable to use.
- Easy to use and Simple UI.
- Freemium Model Access.
- Attendance Management using Face ID.

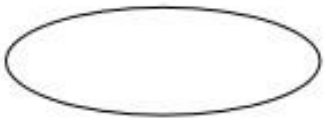
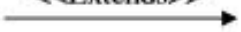
CHAPTER-5 SYSTEM DESIGN

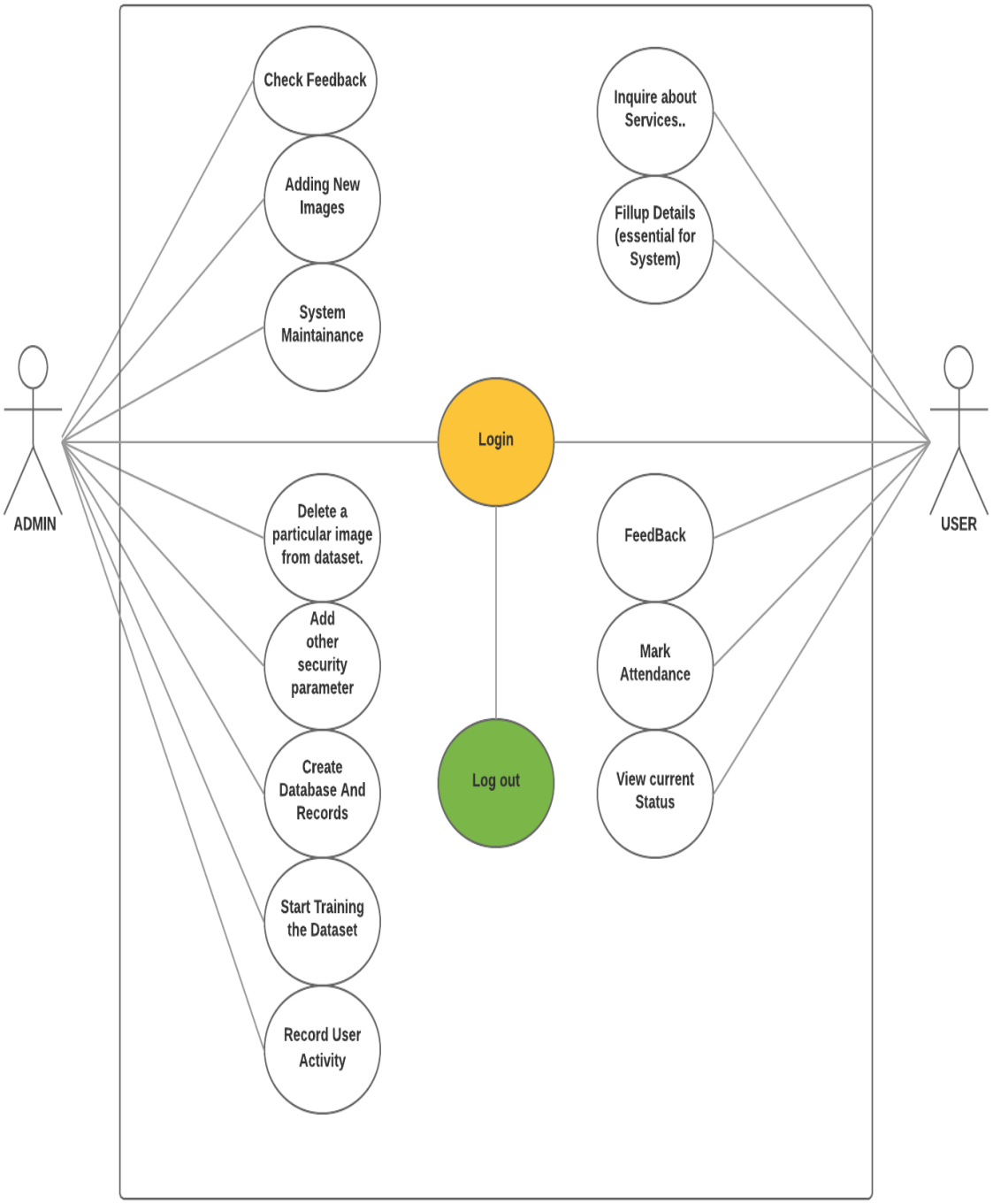
5.1 SYSTEM ARCHITECTURE DESIGN

5.1.1 USE CASE DIGRAM

The Use case diagram is used to define the core elements and processes that make up a system. The key elements are termed as "actors" and the processes are called "UseCases." The Use case diagram shows which actors interact with each use case.

Table: 5.1 Symbols for Use-Case diagram

UseCase: 	Use cases describe what a system does, not how it does it. A use case contains multiple scenarios, each of which describes a specific flow of events through the usecase.
Actor : 	An actor is a person, organization, or external system that plays a role in one or more interactions with the system.
<<Extends>> 	The relationship indicates that the behavior of the extension use case may be inserted in the extended use case under some conditions.
<<include>> 	Include is a Directed Relationship between two use cases, implying that the behavior of the included use case is inserted into the behavior of the including use case.



5.1.1 (a) Use-Case Diagram for User and Admin

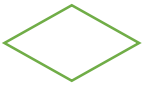
5.1.2 ER DIAGRAM:

Symbols used in E-R diagram:

Rectangles, which represent entity sets.

Ellipses, which represent attributes.

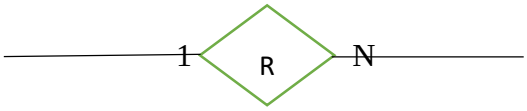
Diamonds, which represent relationship sets.



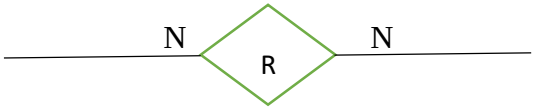
Lines, which link attributes to entity sets and entity sets to relationship sets.

Weak Entity, is an entity that must defined by a foreign key relationship with another entity as it cannot be uniquely identified by its own attributes alone.

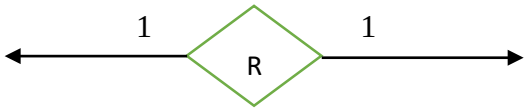
One to many relationship



Many to many relationship

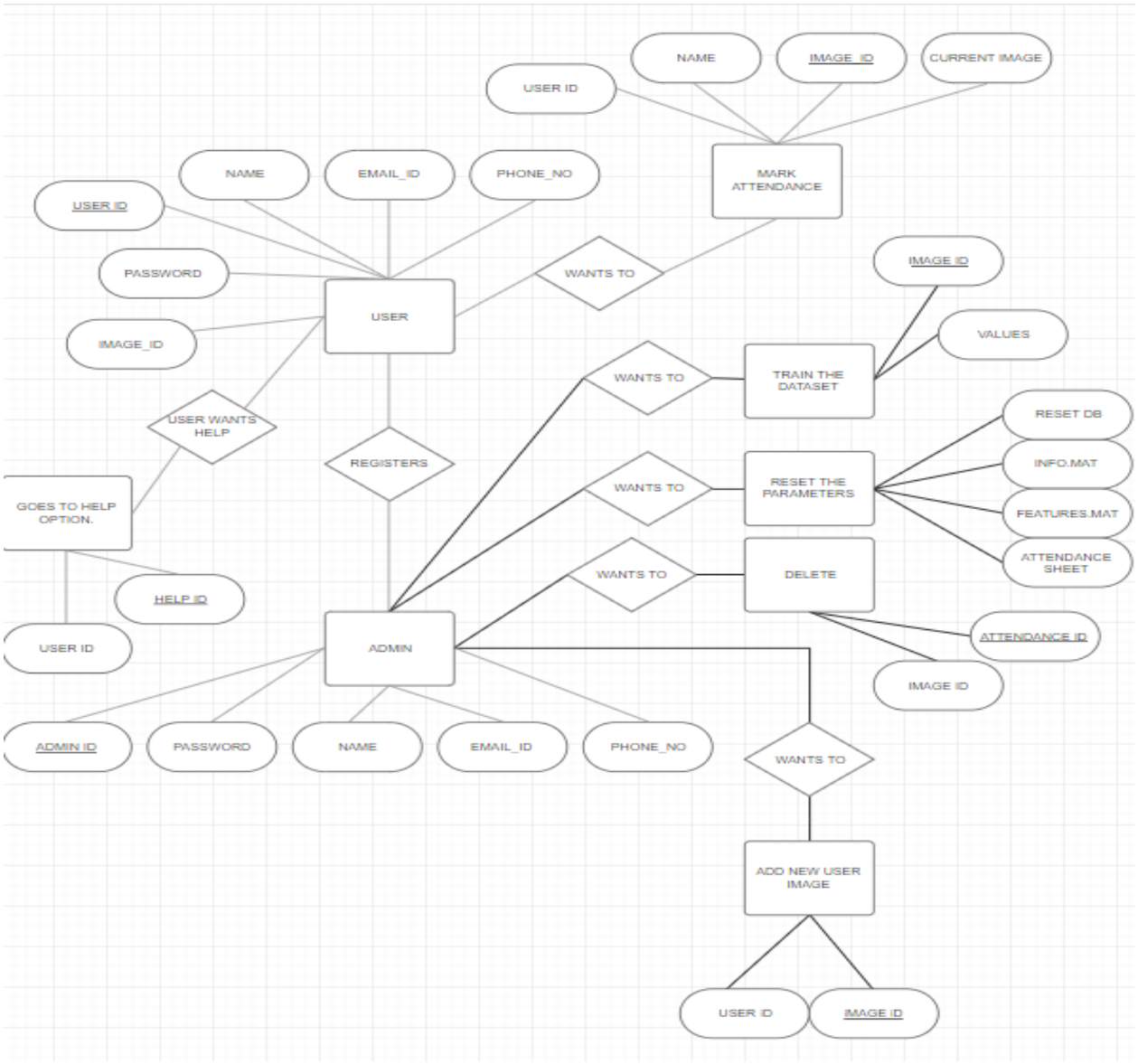


One to one relationship



Multivalued Attribute, it can have more than one value.

Derived Attribute, is based on another attribute.

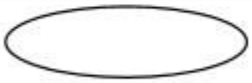


5.1.2 ER-Diagram

5.1.3 SYSTEM ACTIVITY DIAGRAM

Activity diagrams are normally used for business process modelling, for modeling the Logic captured by a single use case or usage scenario, or for modeling the detailed logic of Business rule.

Table: 5.2 Symbols for Activity diagram

Symbol Name	Symbol
Decision	
Control Flow	
Final State	
Initial State	
State	
Action State	
Fork Line	
Join Line	

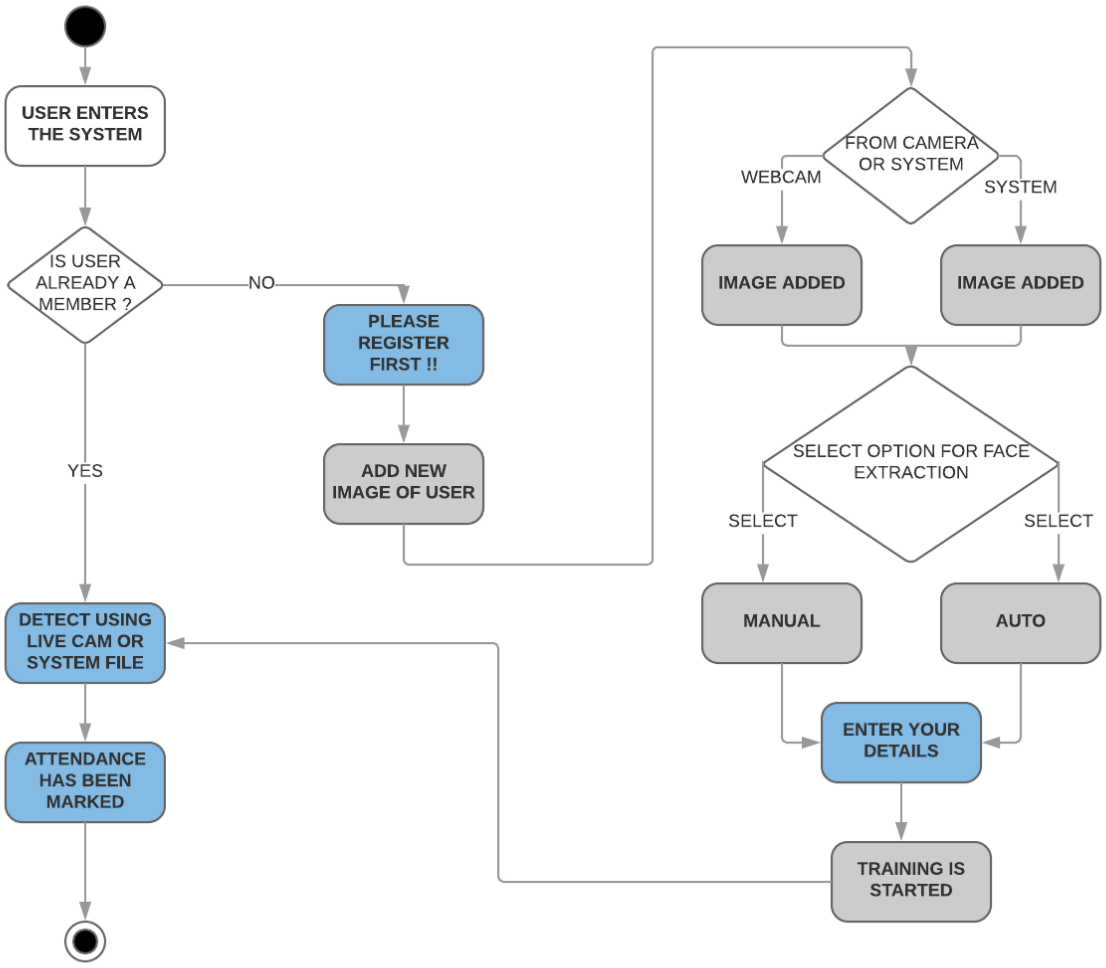


Fig:5.1.3 Activity Diagram

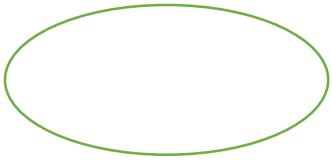
5.1.4 DATA FLOW DIAGRAM

A data flow diagram (DFD) shows the functional relationship of values computed by a System , including input values, output values, and internal data stores.

Symbols used in DFD:

Symbol name Description

Process: People, procedure or devices that use or produce data. The physical Component is not defined.



External entity: An external entity such as an employee, team leader, and HR person are Essentially physical entities external to the software system which interact the system by inputting data to the system or by consuming the data produced by the system.

Data Flow: A data flow symbol represents the data flow occurring between two processes or between, an external entity and a process in the direction of the data flow arrow.

Data store: A data store represents a logical file. The direction of data flow arrow shows whether data is being read from or written into a data store.

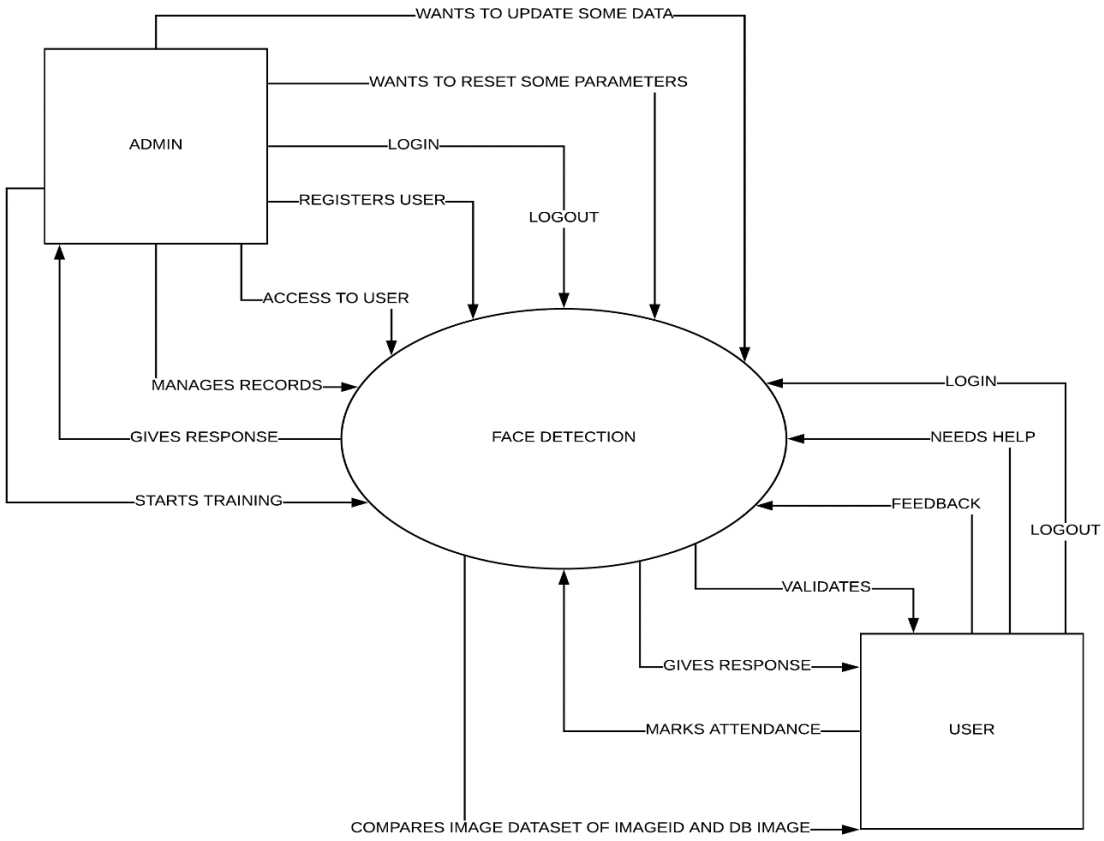


Fig: 5.1.4.1 Data Flow At Context Level for Main System

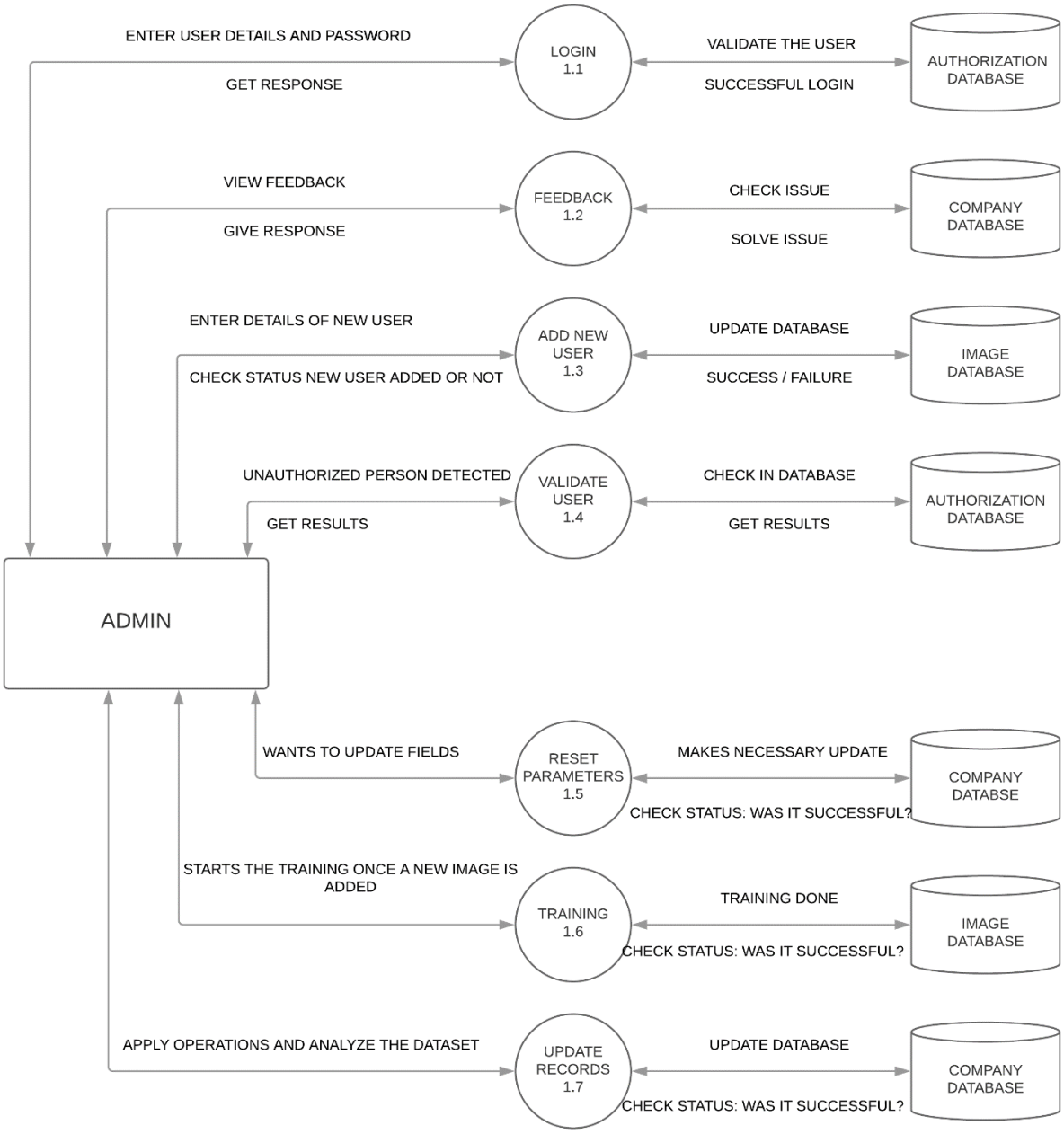


Fig: 5.1.4.2 Data Flow Level-1

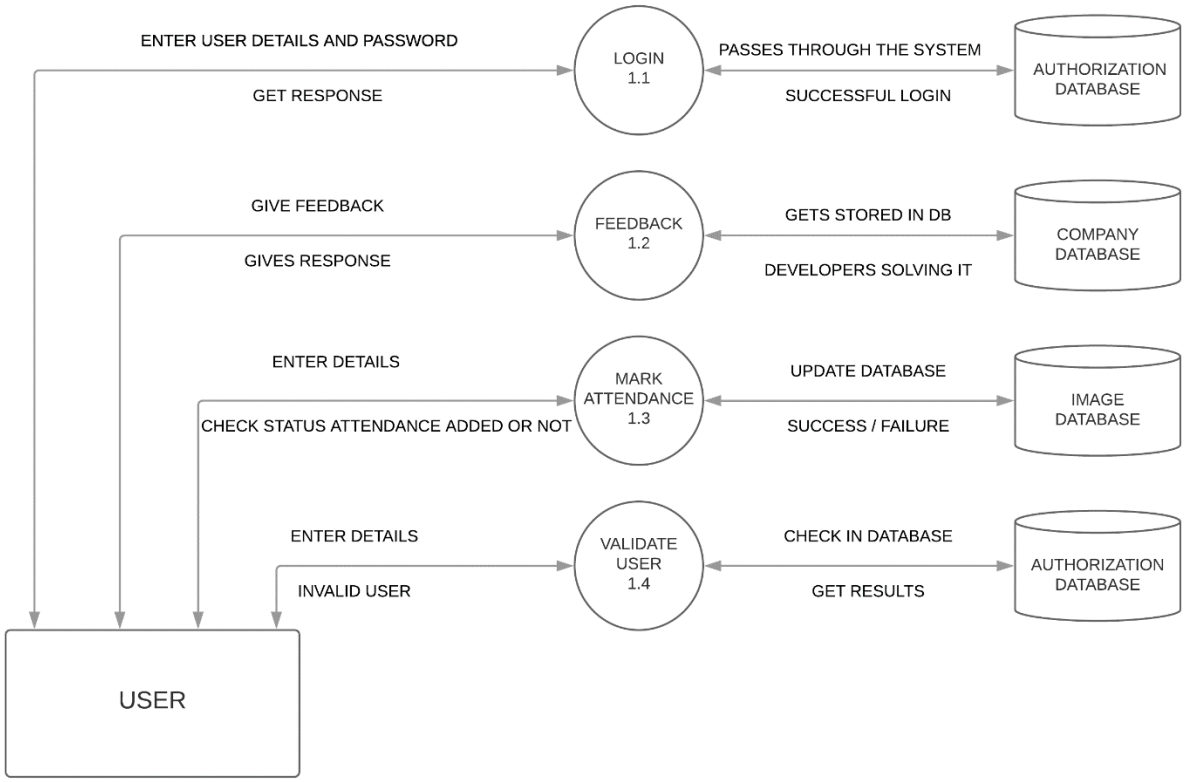


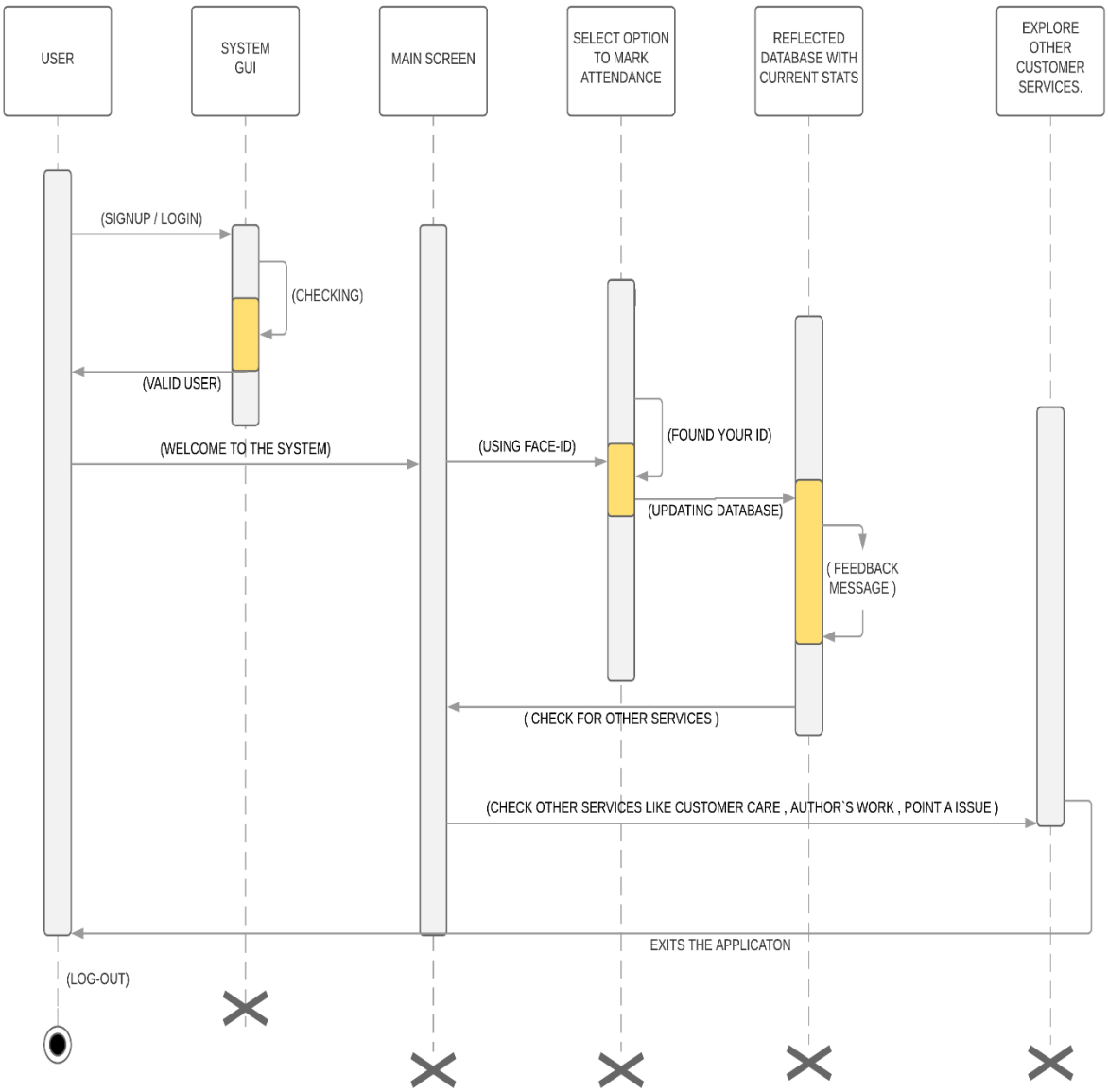
Fig: 5.1.4.3 Data Flow Level-1

5.1.5 SEQUENCE DIAGRAM

It illustrates how objects interact with each other. It emphasizes time ordering of messages it can model simple sequential flows, branching, iteration, recursion and concurrency.

Table: 5.3 Symbols for Sequence diagram

Symbol Name	**Symbol**
Object	Object
Life Line	
Active	CONTINUOUS - LINE
Message	



5.1.5.1 Sequence Diagram for user

5.2 DATA DICTONARY

5.2.1 Login table: It contains all necessary login details for all kind of user.

Field Name	Data Type	Null	Constraints	Description
Image_id	Int(5)	No	Primary_key	Auto Increment of User identification number
M_id	Int(5)	No	Unique_key	This will be used for Image id for particular type of user.
Name	Varchar(20)	No	-	This will be used for storing the name of the user
Password	Varchar(20)	No	-	For Authentication Purpose.

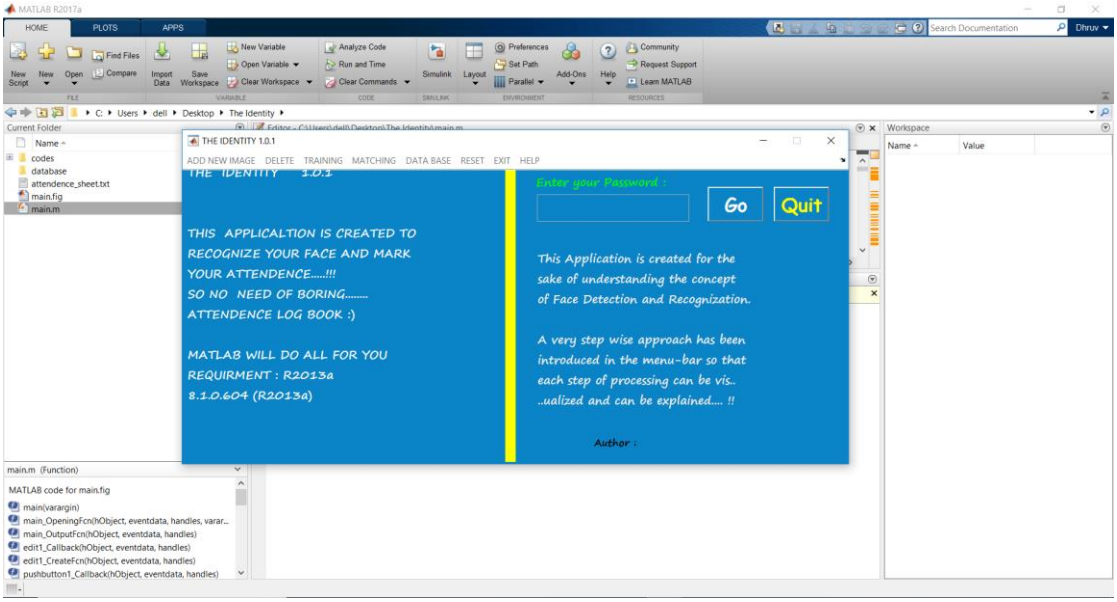
5.2.2 Team member: It contains the details of all the eminent user`s of the system..

Field Name	Data Type	Null	Constraints	Description
Image_id	Int(5)	**No**	**Foreign_key**	Auto Increment of User identification number
M_id	Int(5)	**No**	**Primary_key**	Auto Increment of Member identification number
M_name	Varchar(20)	No	-	This will be used for storing the name of the Member
M_DOB	Date	No	-	Used to store date of birth of Member
M_gender	Varchar(15)	No	-	Identify male/female
M_Ph_no	Longint(10)	No	-	Authentication purpose

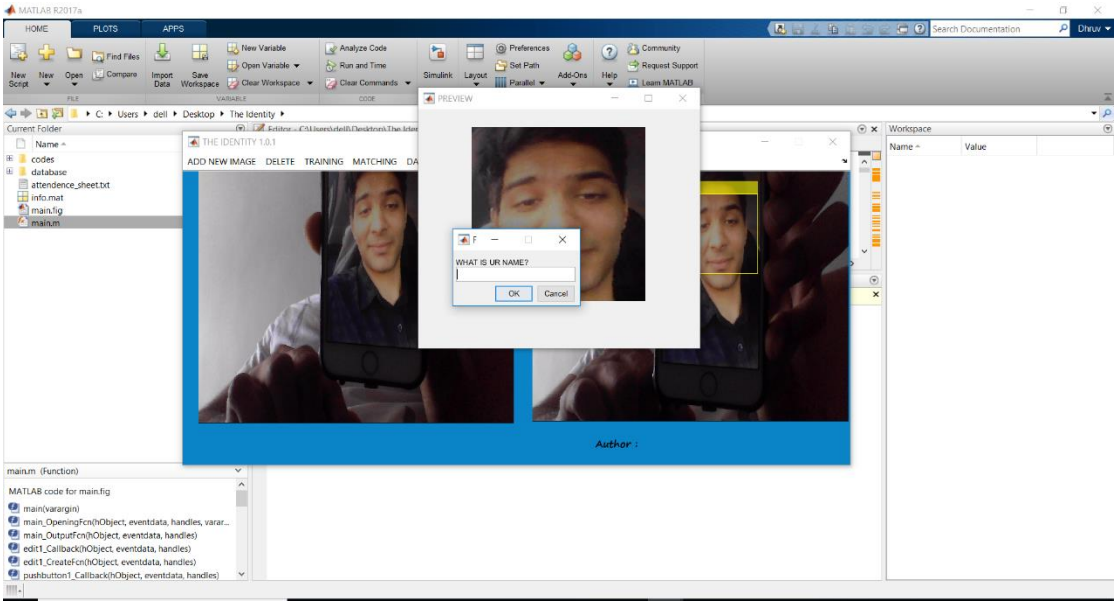
5.2.3 Attendance Table: This table contains Attendance of users

Field Name	Data Type	Null	Constraints	Description
A_id	Int(5)	No	Primary_key	Shows map identification
Image_id	Int(5)	No	Foreign_key	Stores the User identification number
Name	Varchar(5)	Yes	-	Shows Name
Date	Varchar(20)	No	-	Shows Date
Time	Varchar(20)	No	-	Shows Time
Status	Varchar(20)	No	-	Present / Absent

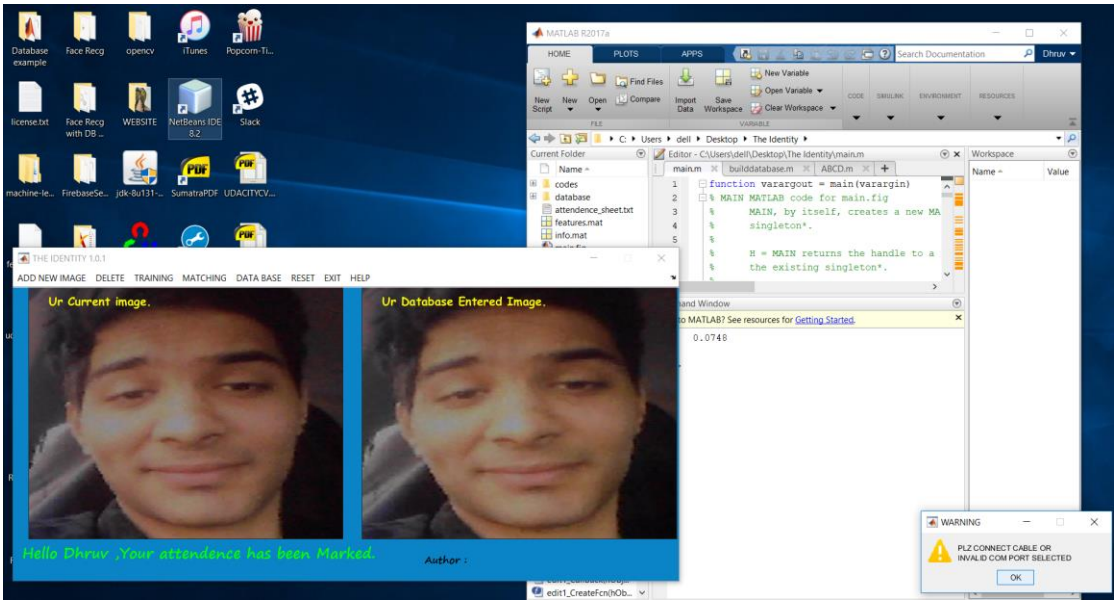
5.3 USER MANUAL



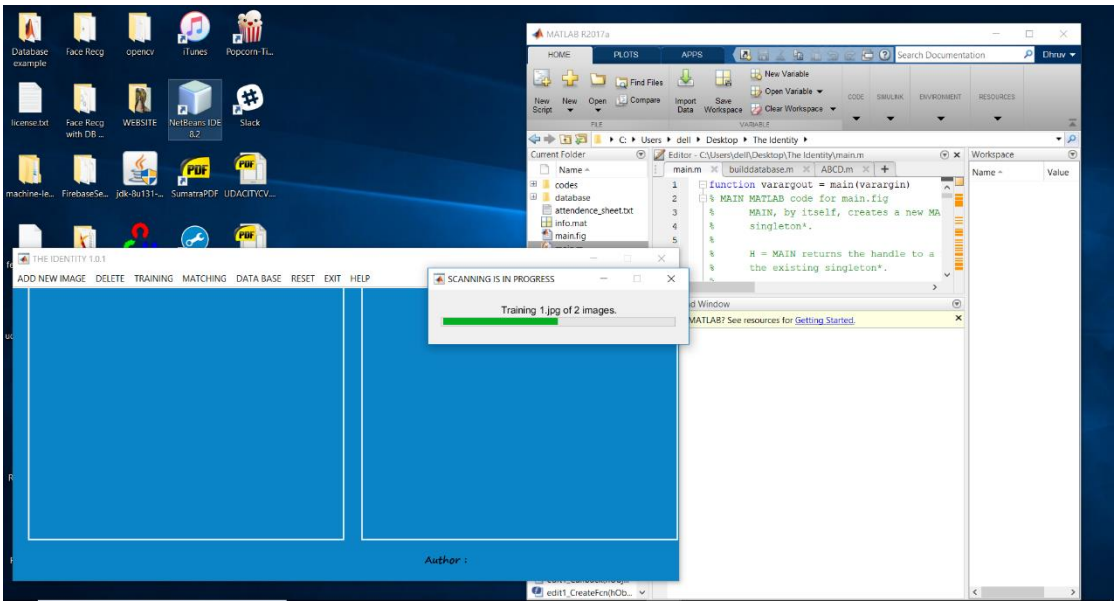
SCREENSHOT 1 Login Activity



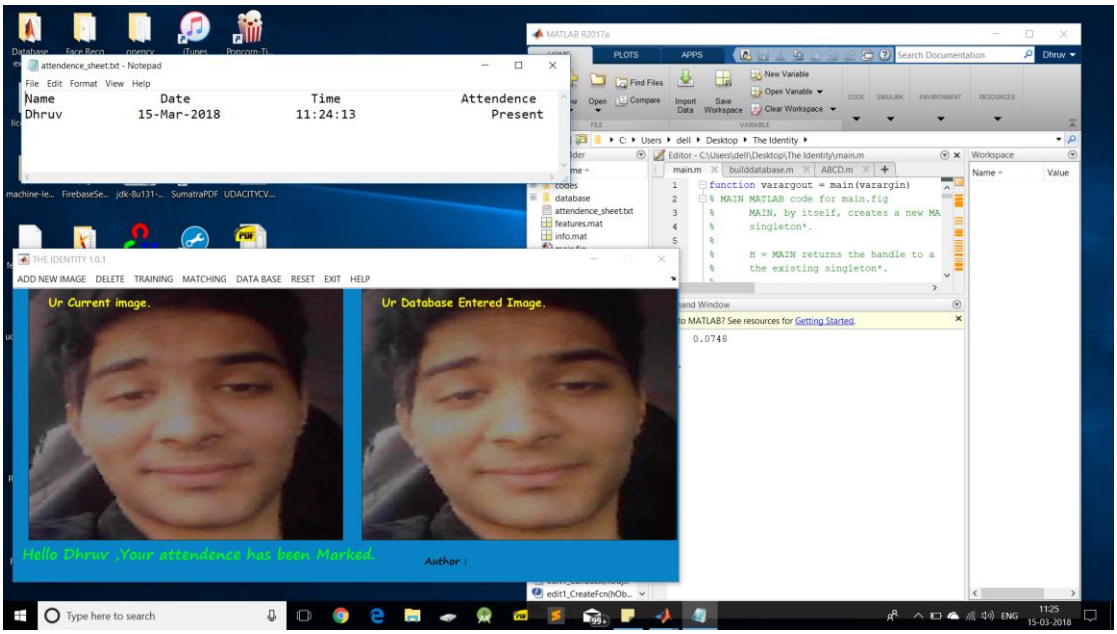
SCREENSHOT 2 Enter your Details



SCREENSHOT 3 Training Started



SCREENSHOT 4 Matching Function for Attendance



SCREENSHOT 5 Status Of Attendance

CHAPTER-6 IMPLEMENTATION PLANNING

6.1 CODING STANDARDS

6.1.1 PURPOSE OF CODING STANDARDS AND BEST PRACTICES

Best practices are a set of informal rules that the software development community has learned over time to improve the quality of applications and simplify their maintenance. They can be broken into many levels based on the coding language, the platform, the target environment and so forth. Using best practices for a given situation greatly reduces the probability of introducing errors into your applications, regardless of which software development model is being used to create that application.

There are coding standards that originated from the intensive study of industry experts who analyzed how bugs were generated when code was written and correlated these bugs to specific coding practices. They took these correlations between bugs and coding practices and came up with a set of rules that when used prevented coding errors from occurring. These standard practices offer incredible value to software development organizations because they are pre-packaged automated error prevention practices; they close the feedback loop between a bug and what must be done to prevent that bug from recurring.

Best practices gives you a way to analyze your source code so that certain rules and patterns can be detected automatically and that the knowledge obtained through previous years of experience by industry experts is implemented in an appropriate way.

6.1.2 NAMING CONVENTION AND STANDARDS

The terms Pascal Casing and Camel Casing are used throughout this document.

PASCAL CASING:-First character of all words are Upper Case and other characters are lower case.

Example: Back Color

CAMEL CASING: - First character of all words, except the first word is Upper Case and other characters are lower case.

Example: back Color

1. User Pascal Casing for Class names public class Hello World

```
{
    ...
}
```

2. Use Camel Casing for method names

```
Void say Hello (string name)
{
    ...
}
```

3. Use Camel Casing for variable names int total Count=0;
4. Use the prefix "I" with Camel casing for interface (Example: IEntity).
5. Use Meaningful, descriptive words to name variables. Do not use Abbreviations.

   Good:

   string address

   Int salary **Not Good:**

   stringaddr install

6. Do not use single character variable name like i, n, s etc. use name like index, temp.
7. One exception in this case would be variables used for iterations in loops: For (int i=0; i<count; i++)

```
{
}
```

8. If the variable is used only as a counter for iteration and is not used anywhere else in the loop, may people still like to use a single char variable (i) instead of inventing a different suitable name.
9. All member variables must be prefixed with underscore (_) so that they can be identified from other local variables.
10. Do not use variable names that resemble keywords.

11. Prefix boolean variables, properties and methods with “is” or similar prefixes. Example: private bool _is Finished
12. File name should match with class name.

    Use Pascal Case for file names.

Exception Handling

- Never do a 'catch exception and do nothing'. If you hide an exception, you will never know if the exception happened or not. Lot of developers uses this handy method to ignore non significant errors. You should always try to avoid exceptions by checking all the error conditions programmatically. In any case, catching an exception and doing nothing is not allowed. In the worst case, you should log the exception and proceed.

- In case of exceptions, give a friendly message to the user, but log the actual error with all possible details about the error, including the time it occurred, method and class name etc.

- Always catch only the specific exception, not generic exception.

Good:

```
Void ReadFromFile (string filename)

        {

        try
        {
                // read from file.
        }
        catch
        {
                // log error.
                //  re-throw exception depending on your case.
                throw;
```

```
        }
    }
```

+

Not Good:

```
Void ReadFromFile ( string filename )
{ try
  {
    // read from file.
  }
Catch (Exception ex)
  {
Return "";
  }
}
```

 When you re throw an exception, use the `throw` statement without specifying the original exception. This way, the original call stack is preserved.

Good:

```
Catch
{
    throw;
}
```

Not Good: catch (Exception

```
Ex)

{
        // do whaz       throw ex;
}
```

CHAPTER-7 TESTING

7.1 TESTING

Testing is a process of executing a program with the intent of finding an error. If testing is conducted successfully, it will uncover the error in the software.

Secondly, testing demonstrates that software functions appear to be working according to specification and that performance requirements appear to have been met. In additional, data collected as testing is conducted provides a good indication of software reliability and some indication of software quality as whole.

But there is one thing that testing cannot do: Testing cannot show the absence of defects, it can only show that software errors are present.

There are several objectives which are as follows:

- Testing is a process of executing a program with the intent of finding an error.
- A good test case is one that has a probability of finding an as undiscovered error.
- A successful test is one that uncovers an as yet undiscovered error.

TESTING PRINCIPLE

Following are the testing principles which are used:

- All tests should be traceable to customer requirement.
- Tests should be planned long before testing begins.
- Testing should be in small and progress toward testing in the large.
- Exhaustive testing is not possible.
- To be most effective testing should be conduct by independent third party.

7.2 TESTING PLAN

The aim of the testing process is to identify all defects existing in software Product. However for most practical systems, even after satisfactorily carrying out the testing phase, it is not possible to guarantee that the software is error free. This is because of the fact that the input data domain of most software products is very large. It is not practical to test the software exhaustively with respect to each value that the input data may assume. Even with this practical limitation of the testing process, the importance of testing should not be underestimated. It must be remembered that testing does expose many defects existing in a Software product. Thus testing

provides a practical way of reducing defects in a System and increasing the users' confidence in a developed system.

FUNCTIONAL TESTING

The testing technique that is going to be used in the project is black box testing. In black box testing the expected inputs to the system are applied and only the outputs are checked.

The working or the other parameters of the functionality are not reviewed or tested on the black box testing technique. There is a specific set of inputs for each and every module which is applied and for each set of inputs the result or the output is verified and if found as per the system working this testing is termed or result is declared as pass.

If the set of inputs that are provided to each module are not giving the outputs as per the expected results from the module then the result of that testing is to be declare failed.

Moreover the bottom up integration of the modules is applied herein so that each module can be verified at the initial stage and if it is found that the independent module is perfectly alright, only then it is going to be integrated with other related modules otherwise the module is checked for flaws and then if it satisfies all the specific requirements of the module, is integrated to other related modules to form and incorporate a system.

In the black-box testing approach, test cases are designed using only the functional specification of the software, i.e. without any knowledge of the internal structure of the software. For this reason, black-box testing is known as functional testing.

EQUIVALENCE CLASS PARTITIONING

In this approach, the domain of input values to a program is partitioned into a set of equivalence classes. This partitioning is done such that the behavior of the program is similar for every input data belonging to the same equivalence class. The main idea behind defining the equivalence classes is that testing the code with any one value belonging to an equivalence class is as good as testing the software with any other value belonging to that equivalence class. Equivalence classes for software can be designed by examining the input data and output data.

BOUNDARY VALUE ANALYSIS

A type of programming error frequently occurs at the boundaries of different equivalence classes of inputs. The reason behind such errors might purely be due to psychological factors. Programmers often fail to see the special processing required by the input values that lie at the boundary of the different equivalence classes. For example, programmers may improperly use < instead of <=, or conversely <= for <. Boundary value analysis leads to selection of test cases at the boundaries of the different equivalence classes.

STRUCTURAL TESTING

In the white-box testing approach, designing test cases requires thorough knowledge about the internal structure of software, and therefore the white-box testing is called structural testing.

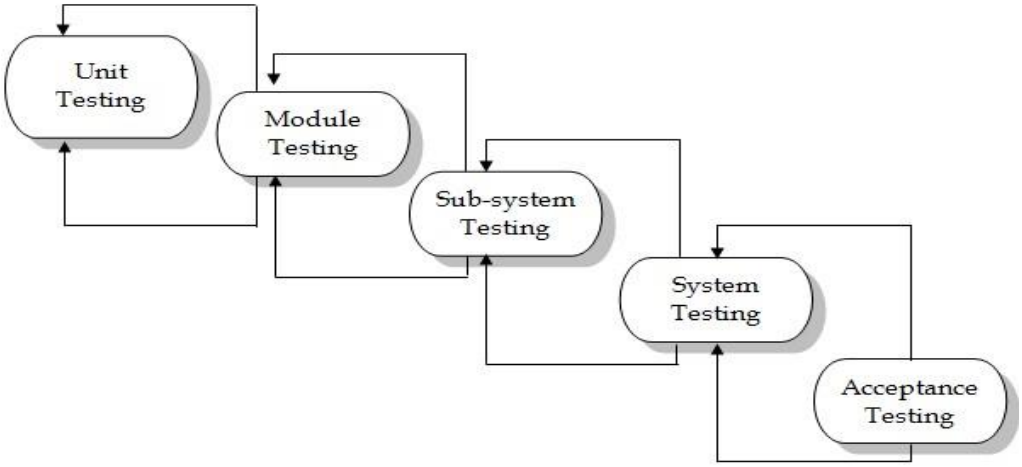


Fig:-7.1 Testing Process.

7.2.1 TESTING STRATEGY

The black box testing is going to be used for the project. The entire module is going to be checked for the specific inputs and the output is going to be checked. We are going to test the modules individually and thereafter if found to be working as per the expectations they are going to be integrated with other successfully tested modules and then on integrated.

At last all the modules are integrated and thereafter it is checked on a broader basis and all the requirements which are specified are checked for each integrated system modules. If all the

functionalities are successfully satisfied than the entire integrated system is found to be working perfectly alright.

The integration is going to be in a bottom up manner where in each individual modules are going to be checked for the first time initially. Later on as and when other modules are developed and are in a working condition than they are integrated and the entire system is going to be generated. As mentioned before these entire system will finally be tested as per the requirements specified by the customer if any flaws are seen they are immediately required to be solved. In short the entire system should be working as per the requirements with no unexpected results.

7.3 TESTING METHODS

Involve execution and implementation of the software with test data and examining the outputs of the software and its operational behavior to check that it is performing as required.

7.3.1 STATISTICAL TESTING

Used to test the program's performance and reliability and to check how it works under operational conditions. Tests are designed to reflect the actual user inputs and their frequency.
The stages involved in the static analysis are follows. ➢

Control flow analysis

- Unreachable code
- Unconditional branches into loops

➢ Data use analysis

- Variable used before initialization
- Variables declared but never used
- Variables assigned twice but never used between assignments
- Possible array bound violations
- Declared variables ➢ Interface analysis
- Parameter type mismatches
- Parameter number mismatches
- Non-usage of the results of functions
- Uncalled functions and procedures ➢ Storage management faults

- Unassigned pointers
- Pointer arithmetic

7.3.2 DEFECT TESTING

Intended to find inconsistencies between a program and its specification. These inconsistencies are usually due to program faults or defects.

- We have tested our functions of component to check the specification of our components.
- We selected input set to test the components like in query process we gave the different kinds of inputs to examine their output.
- We test software with sequences that have only a single value.
- We used different sequences of different sizes in different tests.
- Derived tests so that the first, middle and last elements of the sequence and accessed to reveal the problems at partition boundaries.

7.4 TEST CASES

7.4.1 PURPOSE

The purpose of this application is to reduce overhead in paper work and all the records are maintained such that the user as well as administrator can easily segment them into desired properties so it is easy for any novice user to have access to the application.

Another purpose is to make record of papers in database so it can be referred in future.

7.4.2 REQUIRED INPUT AND EXPECTED RESULT

TABLE 7.1 LOGIN

TEST CASE ID: TC_Login_01	**NAME: Login**
TESTING STRATAGY:	Black Box and White Box Testing
PURPOSE:	Checking the authenticity of the user.
INPUT:	Username, password
TEST DATA:	tb_email, tb_password
EXPECTED O/P:	If email and password are correct then user is allowed to enter in to the system and if not then he/she is again asked to enter the username and password
UNBEHAVIOURABLE O/P:	N.A.
STEPS: **1.** After user enters email and password it is going to be verified with database and allows user to access system if both matches correctly	

TABLE 7.2 USER REGISTER

TEST CASE ID: TC_Login_02	**NAME:**
TESTING STRATAGY:	Black Box and White Box Testing
PURPOSE:	Checking the authenticity of the users password.
INPUT:	Password, Conform password
TEST DATA:	tb_pwd , tb_cpwd
EXPECTED O/P:	If password and conform password are same then user is allowed to register in to the system and if
	not then he/she is again asked to enter the same password and conform password.
UNBEHAVIOURABLE O/P:	N/A
STEPS: **1.** After user enters same password and confirm password it is going to be verified with database and allows user to register in system if both matches correctly	

LIMITATION & FUTURE EXPANSION

LIMITATION AND FUTURE EXPANSION:

- There are certain limitations to this technology which are described below:
    1. Image quality: Image quality affects how well facial-recognition algorithms work. The image quality of scanning video is quite low compared with that of a digital camera. Even high-definition video is, at best, 1080p (progressive scan); usually, it is 720p. These values are equivalent to about 2MP and 0.9MP, respectively, while an inexpensive digital camera attains 15MP. The difference is quite noticeable.
    2. Image size: When a face-detection algorithm finds a face in an image or in a still from a video capture, the relative size of that face compared with the enrolled image size affects how well the face will be recognized. An already small image size, coupled with a target distant from the camera, means that the detected face is only 100 to 200 pixels on a side. Further, having to scan an image for varying face sizes is a processor-intensive activity. Most algorithms allow specification of a face-size range to help eliminate false positives on detection and speed up image processing.
    3. Face Angle: The relative angle of the target's face influences the recognition score profoundly. When a face is enrolled in the recognition software, usually multiple angles are used (profile, frontal and 45-degree are common). Anything less than a frontal view affects the algorithm's capability to generate a template for the face. The more direct the image (both enrolled and probe image) and the higher its resolution, the higher the score of any resulting matches.
    4. Processing and Storage: Even though high-definition video is quite low in resolution when compared with digital camera images, it still occupies significant amounts of disk space. Processing every frame of video is an enormous undertaking, so usually only a fraction (10 percent to 25 percent) is actually run through a recognition system. To minimize total processing time, agencies can use clusters of computers. However, adding computers involves considerable data transfer over a network, which can be bound by input-output restrictions, further limiting processing speed

The purpose of future will be to work with Infrared Camera, I also research a bit and found out Goldeye G-032 SWIR enables monitoring in the infrared range, now what it is ?

The Bonn-Rhein-Sieg University of Applied Sciences used the short-wave infrared Goldeye G-032 SWIR camera from Allied Vision, equipped with a GigE-Vision interface with Power over Ethernet, for the research and development of both projects. It is the best suited camera for the wavelength range in which the spectral signature is measured. Specifically in security technology, the camera is commonly not connected directly to a computer or processing unit. Image data must cover a long distance. The Goldeye camera is optimally equipped in this regard as well. With a single cable, it can transmit data up to 100 meters and supply the camera with power at the same time. Another advantage of Allied Vision's camera in surveillance technology is its compact form, including its versatile attachment/mounting/connection options.

CONCLUSION AND REFERENCE

CONCLUSION:

So far I have completed my project and it is fully functional, now my next task will be to explore various other domains where face recognition can be used, some of them are listed below…..

1. Security: Companies are training deep learning algorithms to recognize fraud detection, reduce the need for traditional passwords, and improve the ability to distinguish between a human face and a autograph.
2. HealthCare: Machine Learning is being combined with the computer vision to more accurately track patient medication consumption and support pain management procedures.
3. Marketing: fraught with ethical considerations, marketing is a burgeoning domain of facial recognition becomes ubiquitous.

REFERENCE:

1. HTTPS://TOWARDSDATASCIENCE.COM/HOW-TO-TRAIN-YOUR-OWN-OBJECT-DETECTOR-WITH-TENSORFLOWS-OBJECT-DETECTOR-API-BEC72ECFE1D9
2. HTTPS://WWW.GOOGLE.CO.IN/SEARCH?Q=REQUIREMENTS+TO+RUN+OBJECT+DETECTION+ON+LAPTOP&RLZ=1C1CHZL_ENIN747IN747&OQ=REQUIREMENTS+TO+RUN+OBJECT+DETECTION+ON+LAPTOP&AQS=CHROME..69I57.11215J0J4&SOURCEID=CHROME&IE=UTF-8.
3. HTTPS://GITHUB.COM/TENSORFLOW/MODELS
4. HTTPS://WWW.YOUTUBE.COM/CHANNEL/UCWN3XXRKMTPMBKWHT9FUE5

APPENDIX-I

PERIODIC PROGRESS REPORT (1 TO 4)

College : SAL COLLEGE OF ENGINEERING

StudentName : Rajpurohit Dhruv Narayan

EnrollmentNo : 141130116078 Department : Information Technology

MobileNo : 9099039706 Discipline : BE

Email : dhruv.n.rajpurohit@gmail.com Semester : Semester 8

PPR Details

Periodic Progess Report : First PPR

Project : FACE DETECTION

Status : Submitted

1. What Progress you have made in the Project ?

We have carefully analyzed all the requirements of our project and prepare the abstract of the project. We discussed existing system problem & think about the possible solutions, So we can build a new system that can be useful and easy to use.

2. What challenge you have faced ?

The problem we faced is like which language we should use in order to develop our application and it should be easy as well as output efficient at the same time.

3. What support you need ?

We need guidance from our seniors and Internal guides, who can motivate us as well as direct us (educate us) towards the betterment of the product or application we intend to make.

4. Which literature you have referred ?

Until now, we are using blog posts and articles through which new advancements, as well as insights, can be carried out, which will eventually help us in getting a better understanding of our work-flow.

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

PPR Details

Periodic Progess Report : Second PPR

Project : FACE DETECTION

Status : Submitted

1. What Progress you have made in the Project ?

Creating accurate machine learning models capable of localizing and identifying multiple objects in a single image remains a core challenge in computer vision.

2. What challenge you have faced ?

Creating accurate machine learning models capable of localizing and identifying multiple objects in a single image remains a core challenge in computer vision.

3. What support you need ?

I need guidance from my mentors regarding tensor-flow and how to use it to detect persons as an object, which is the main core problem of our project as of now.

4. Which literature you have referred ?

"Speed/accuracy trade-offs for modern convolutional object detectors." Huang J, Rathod V, Sun C, Zhu M, Korattikara A, Fathi A, Fischer I, Wojna Z, Song Y, Guadarrama S, Murphy K, CVPR 2017

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

PPR Details

Periodic Progess Report : Third PPR

Project : FACE DETECTION

Status : Submitted

1. What Progress you have made in the Project ?

Previously we figured out how to use tensor-flow, but it was a limited technology as only persons where detected but not recognized, in our project somehow we have to use face detection along with face recognition and so need of OpenCV comes along.

2. What challenge you have faced ?

Now we are trying to create familiarity with OpenCV and using eigenfaces algorithm to detect faces and later recognize them.

3. What support you need ?

Documentation and hand`sOn on the OpenCV framework and to create a satisfactory Output, some online content or books on OpenCV to guide through the process, also which algorithm to be used to create an output with almost 100% accuracy.

4. Which literature you have referred ?

OpenCV.org is quite helpful as it teaches us much about the framework and how to use it efficiently, many blog post on OpenCV is been taken into consideration, also documentation on OpenCV.

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

Comment by University Admin :

None

PPR Details

Periodic Progess Report : Forth PPR

Project : FACE DETECTION

Status : Submitted

1. What Progress you have made in the Project ?

Until now I`m almost done with the project it is able to detect peoples faces and mark their attendance in SQLite database, and the constant log is developed so that particular student activity can be tracked throughout the class.

2. What challenge you have faced ?

Now I`m trying to create a good UI and to imply somewhat more robustness and accuracy to the algorithm in the project. MATLAB is fast: Run deployed models up to 7x faster than TensorFlow and up to 4.5x faster than Caffe2.

3. What support you need ?

Now I`m going to try Matlab to create a project and creating a good UI, so I need help with Matlab and how to use its features to create my final year project more satisfying.

4. Which literature you have referred ?

MathWorks.com is the best source for Matlab, a high-level language and interactive environment used by millions of engineers and scientists worldwide. The matrix-based language is a natural way to express computational mathematics.

Comments

Comment by Internal Guide :

None

Comment by External Guide :

None

Comment by HOD :

None

Comment by Principal :

None

APPENDIX-II

BUSINESS MODEL CANVAS REPORT

BUSINESS MODEL CANVAS REPORT

FOR

FACE DETECTION

(IMPLEMENTATION)

Now, according to Paul Graham the co-founder of the seed capital firm Y Combinator the best Startup ideas tend to be something that founders want and something they can build themselves, so what are the advantages of choosing a problem you have yourselves well first and foremost it ensures the problem really exists and second of all it makes it a lot easier for you to develop empathy for your users, another important aspect is how much do users need your product?

It`s better to have a few people who absolutely need your product than having a lot of people who might want your product.

That`s when Business Model Canvas comes handy which is nothing but a visual chart with elements describing a firm`s or a product`s value proposition, customers and finances.

Application of BMC:

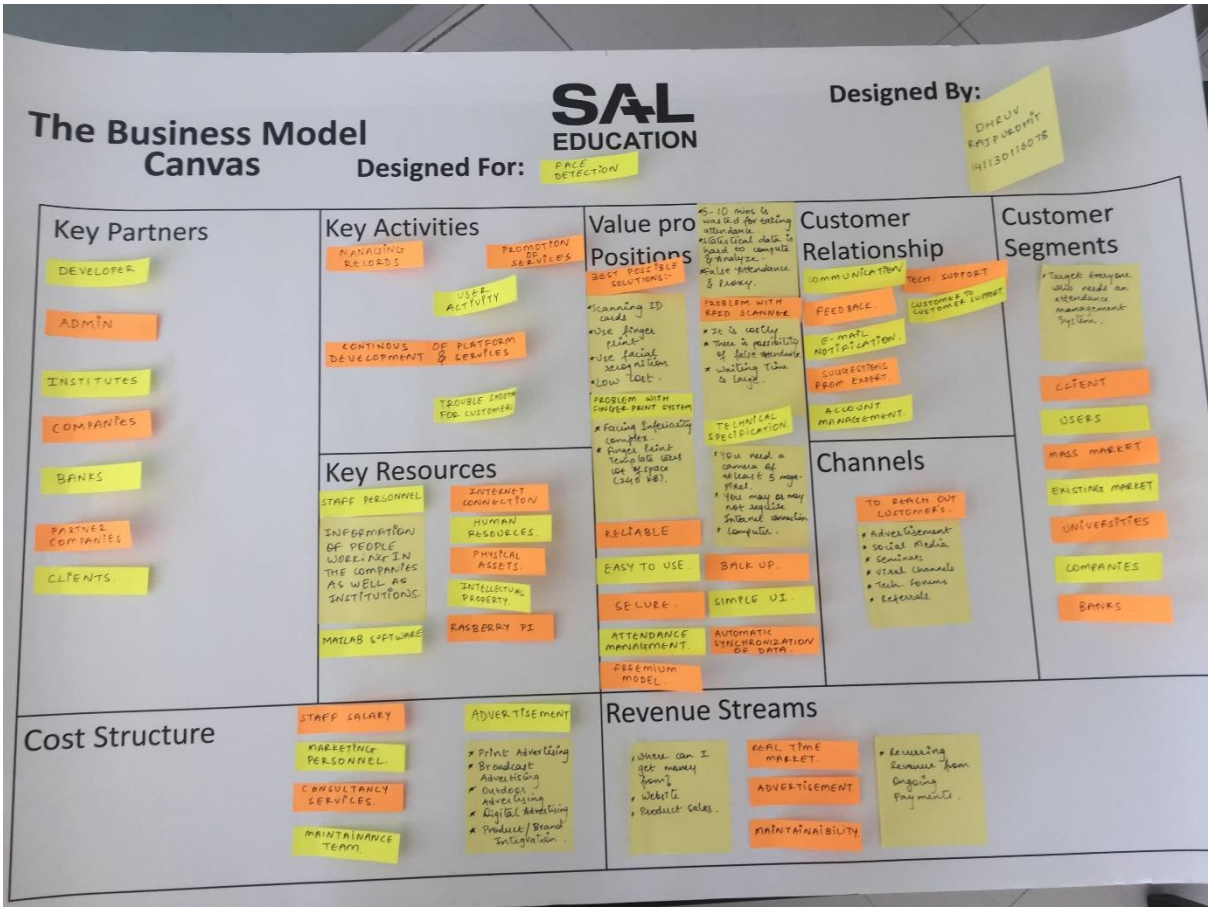
Business Model Canvas can be printed out on a large surface so groups of people can jointly start sketching and discussing business model elements with post-it notes.

Dhruv Rajpurohit.

141130116078

Sal College Of Engineering.

Business Model Canvas



- KEY PARTNERS:

  IN ORDER TO OPTIMIZE OPERATIONS AND REDUCE RISKS OF A BUSINESS MODEL, ORGANIZATIONS USUALLY CULTIVATE BUYER-SUPPLIER RELATIONSHIPS SO THEY CAN FOCUS ON THEIR ACTIVITY.

  1. DEVELOPERS
  2. ADMINS
  3. INSTITUTES
  4. COMPANIES
  5. BANKS

6. PARTNER COMPANIES
7. OTHER CLIENTS.

- KEY ACTIVITIES:

THE MOST IMPORTANT ACTIVITIES IN EXECUTING A COMPANY`S VALUE PROPOSITION.

1. MANAGING RECORDS
2. PROMOTION OF SERVICES
3. USER ACTIVITY
4. CONTINUOUS DEVELOPMENT OF PLATFORM AND SERVICES
5. TROUBLE SHOOTING FOR CUSTOMERS

- KEY RESOURCES:

THE RESOURCES THAT ARE NECESSARY TO CREATE VALUE FOR THE CUSTOMER. THEY ARE CONSIDERED AN ASSET TO A COMPANY, WHICH ARE NEEDED IN ORDER TO SUSTAIN AND SUPPORT BUSINESS.

1. STAFF PERSONNEL
2. INTERNET CONNECTION
3. HUMAN RESOURCES
4. PHYSICAL ASSETS
5. INTELLECTUAL PROPERTY
6. RASBERRY PI
7. MATLAB SOFTWARE

- CHANNELS:

A COMPANY CAN DELIVER ITS VALUE PROPOSITION TO ITS TARGETED CUSTOMERS THROUGH DIFFERENT CHANNELS.

1. ADVERTISEMENT

2. SOCIAL MEDIA
3. SEMINARS
4. VIRAL CHANNELS
5. TECH FORUMS
6. REFERRALS

- COST STRUCTURE:

  THIS DESCRIBES THE MOST IMPORTANT MONETARY CONSEQUENCES WHILE OPERATING UNDER DIFFERENT BUSINESS MODELS.

1. STAFF SALARY
2. MARKETING PERSONNEL
3. CONSULTANCY SERVICES
4. MAINTENANCE TEAM
5. ADVERTISEMENT

- REVENUE STREAMS:

  THE WAY A COMPANY MAKES INCOME FROM EACH CUSTOMER SEGMENT.

1. WEBSITE
2. PRODUCT SALES
3. ANALYZING REAL TIME MARKET
4. ADVERTISEMENT
5. RECURRING REVENUE FROM ONGOING PAYMENTS

- CUSTOMER RELATIONSHIP:

  TO ENSURE THE SURVIVAL OF ANY BUSINESS, COMPANIES MUST IDENTIFY THE TYPE OF RELATIONSHIPS THEY WANT TO CREATE WITH THEIR CUSTOMER SEGMENTS.

1. COMMUNICATION
2. FEEDBACK
3. EMAIL NOTIFICATION
4. SUGGESTIONS FROM EXPERT
5. ACCOUNT MANAGEMENT
6. TECH SUPPORT
7. C2C SUPPORT

- CUSTOMER SEGMENTS:

TO BUILD AN EFFECTIVE BUSINESS MODEL, A COMPANY MUST IDENTIFY WHICH CUSTOMERS IT TRIES TO SERVE.

1. TARGET EVERYONE WHO NEEDS AN ATTENDANCE MANAGEMENT SYSTEM
2. CLIENT / USERS
3. ANALYZING MASS MARKET
4. DIVERSIFYING CUSTOMER NEEDS

- VALUE PROPOSITION:

COLLECTION OF PRODUCTS AND SERVICES A COMPANY OFFERS TO MEET THE NEEDS OF IT`S CUSTOMERS.

i) PROBLEMS FACED:

- ✓ 5-10 MINUTES IS WASTED FOR TAKING ATTENDANCE
- ✓ STATISCAL DATA IS HARD TO COMPUTE & ANALYZE
- ✓ FALSE ATTENDANCE AND PROXY

ii) BEST POSIIBLE SOLUTIONS:

- ✓ SCANNING ID CARDS
- ✓ USE OF FINGER-PRINT
- ✓ USE OF FACIAL RECOGNITION

iii) LOW TECHNICAL SPECIFICATION:

1. RELIABLE
2. EASY TO USE
3. SECURE DATABASE
4. ATTENDANCE MANAGEMENT WITH NEW TECHNOLOGY
5. FREEMIUM MODEL
6. SIMPLE UI
7. BACK-UP ASSISTANCE
8. AUTOMATIC SYNCHRONIZATION OF DATA

APPENDIX-III

PATENT DRAFTING EXERCISE

College : SAL COLLEGE OF ENGINEERING

Department : Information Technology

Discipline : BE

Semester : Semester 8

Project Name : FACE DETECTION

Team ID : 24307

Form 1 – APPLICATION FOR GRANT OF PATENT

Applicants :

Sr.

No

Name Nationality Address Mobile No. Email Id

1

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Narayan

Indian

Information

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SAL COLLEGE OF

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1

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ENGINEERING ,

Gujarat

Technologycal

University.

9099039706 dhruv.n.rajpurohit@gmail.com

I/We, the applicant(s) hereby declare(s) that:

Following are the attachments with the applications :

Form 2 - PROVISIONAL/COMPLETE SPECIFICATION

1 . Title of the project/invention :

FACE DETECTION

2. Preamble to the description :

Provisional

3. Description

a) Field of Project / Invention / Application :

Computer Vision is mimicking the abilities of human vision by electronically perceiving and understanding

an image. It is a broad term and includes a lot of domains like Gesture Recognition, Optical Character

Recognition, Face detection and a lot more. In this system, we will be focussing on face detection and try

to understand the key ideas that allow us to detect human faces in real time.

b) Prior Art / Background of the Project / Invention :

BEST POSSIBLE SOLUTIONS UNTIL NOW:

4/13/2018 PDE Details

2/3

1) RFID SCANNER AND IT`S PROBLEM:

-> COSTLIER WHEN IT COMES TO SETUP

-> FALSE ATTENDANCE USING OTHER PEOPLE`S KEY.

-> WAITING TIME IS LARGE.

2) FINGERPRINT SYSTEM AND IT`S PROBLEM:

-> FINGERPRINT TEMPLATE TAKES A LOT OF SPACE (APPROX VALUE 240KB)

-> INEFFICIENT BECAUSE OF SMUDGES.

-> GERMS INTAKE AS WELL AS CREATES AN INFERIORITY COMPLEX.

3) FACE DETECTION ATTENDANCE MANAGEMENT SYSTEM.

c) Summary of the Project / Invention :

1) USAGE OF COLOR MOMENT ALGORITHM.

2) CREATE AND TRAIN THE DATASET, ONE TIME ONLY.

3) DETECT AND CROP THE FACES IN AN INPUT IMAGE.

4) RECOGNIZE FACES AND MODIFY THE ATTENDANCE IN THE EXCEL SHEET.

5) RELIABLE.

6) EASY TO USE AND SIMPLE UI.

7) FREEMIUM MODEL ACCESS.

8) ATTENDANCE MANAGEMENT USING FACE ID.

d) Objects of Project / Invention :

MATLAB SOFTWARE

COLOR MOMENT ALGORITHM

COMPUTER OR AUTONOMOUS SYSTEM

RASBERRY PI

WEBCAM

e) Drawings :

f) Description of Project / Invention : (full detail of project) :

The first efficient Face Detector

(Viola-Jones Algorithm, 2001)

An efficient algorithm for face detection was invented by Paul Viola and Michael Jones.

Their Demo showed faces being detected in real-time on a webcam feed.

Computer Vision was born!

But, it leads to failure because all the features of a human-face were Hardcoded and were static, so if the

linear orientation of the face changed by some parameters it was not able to detect it.

Later, came Histograms of Oriented Gradients in 2005 by Navneet Dalal for pedestrian detection.

So, how did it worked?

So, let`s say for every image of a face or an object it will eventually check for how dark is the current pixel

as compared to the surrounding pixels, and lastly shows an Arrow(->) that in which direction the image got

darker.

And they repeated this process for every individual pixel in an Image.

Gradients show the flow from light to dark across the entire image.

Later on, they break-up an image into small squares of 16x16 pixels each.

Now, we`ll count up to how many gradients point in a major direction.

And replace that square in the image with the arrow directions that were the strongest.

Image classification can perform some pretty amazing feats, but a large drawback of many image

classification applications is that the model can only detect one class per image. With an object detection

model, not only can you classify multiple classes in one image, but you can specify exactly where that

object is in an image with a bounding box framing the object. This application is created to recognize your

face and mark your attendance. So no need for boring attendance log book. Matlab will do all for you.

g) Examples :

h) Claims (Not required for Provisional Application) / Unique Features of Project

So far I have completed my project and is fully functional, now my next task will be to explore various

other domains where face recognition can be used. some of them are listed below…

4/13/2018 PDE Details

3/3

1) Security: companies are training deep learning algorithms to recognize fraud detection, reduce the need

for traditional passwords, and to improve the ability to distinguish between a human face and a autograph.

2) Healthcare: machine learning is being combined with the computer vision to more accurately track

patient medication consumption and support pain management procedures.

3) Marketing: fraught with ethical considerations, marketing is a burgeoning domain of facial recognition

innovation, and it`s one we can expect to see more of as facial recognition becomes ubiquitous.

4. Claims

5. Date and signature

6. Abstract of the project / invention :

THIS PROJECT IS BASED ON FACE RECOGNITION WHICH IS SUB-PART OF COMPUTER

VISION AND IT IS USED TO MARK THE ATTENDANCE OF THE USER WITH CURRENT TIME

AND DATE USING FACE RECOGNITION.

IT IS THE PROCESS OF IDENTIFYING ONE OR MORE PEOPLE IN IMAGES OR VIDEOS BY

ANALYZING AND COMPARING PATTERNS. ALGORITHMS FOR FACE RECOGNITION

TYPICALLY EXTRACT FACIAL FEATURES AND COMPARE THEM TO A DATABASE TO FIND

THE BEST MATCH.

Form 3 – STATEMENT AND UNDERTAKING UNDER

SECTION 8

Name of the applicant(s) : I/We, Rajpurohit Dhruv Narayan

Name,Address and Nationality

of the joint applicant :

Hereby declare :

(i) that I/We have not made any application for the same/substantially the

same victim invention outside India.

(ii) that the rights in the application(s) has/have been assigned to

Name of

the Country

Date of

Application

Application

Number

Status of the

Application
Date of
Publication
Date
of
Grant
N/A N/A N/A N/A N/A N/A
(iii)That I/We undertake that upto the date of grant of the patent by the Controller, I/We would keep him informed in writing the details regarding corresponding applications for patents filed outside India within three months from the date of filing of such application.
Dated this 13 day of April 2018
To be signed by the applicant
or his authorised registered
patent agent :
Signature.....
Name of the Natural Person
who has signed :
Rajpurohit Dhruv Narayan
To,
The Controller of Patents,
The Patent Office,
At Mumbai

APPENDIX-IV
PLAGIARISM REPORT

PLAGIARISMA

94% Unique

Total 51187 chars (2000 limit exceeded) , 268 words, 4 unique sentence(s).

Results	Query	Domains (original links)
Unique	34 Figure 5.1.4.2 DFD Level-1 35 Figure 5.1.5.1 Sequence Diagram for User 37 Figure 5.1.5.2	.
Unique	Certificate II GTU Completion Certificate (7th & 8th Sem) III Acknowledgement Iv Abstract	.
Unique	Project Features 02 1.4 Project Objectives 02 1.5 Technology and Literature Review 03 1.5.1 Technology	.
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