A

Software Requirements Specification On

Face Detection Attendance System

Mentor:
Ms. Richa Rawal
Associate Professor

Submitted To:
Ms. Sanju Chaudhary
Associate Professor

Submitted by:
Ishika Agarwal(19ESKIT032)
Kritika Surana(19ESKIT046)
Kunal Bharagatiya(19ESKIT048)
Lavanya Jain(19ESKIT051)

DEPARTMENT OF INFORMATION TECHNOLOGY

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

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1. Introduction

1.1 Problem Definition

To develop an automated attendance system using face recognition concept in a classroom with large number of students, it is a very tedious and time-consuming task to take the attendance manually. Therefore, we can implement an effective system which will mark the attendance of students automatically by recognizing their faces. The process of this face recognition system is divided into various steps, but the important steps are detection of and recognition of face.

1.2 Document Conventions

The format of this document is referred from the standard IEEE guidelines:

- Font face: Times New Roman
- Font size:
    - Heading: 18
    - Subheading: 14
    - Description: 12
- Bold face and indentation is used on general topics and or specific points of interest including the heading and sub-heading.

1.3 Intended Audience and Reading Suggestions

This document is mainly intended for project guides. The sequence for reading the document begins with the overview sections and proceeding through the sections that are most pertaining to each reader type.

1.4 Purpose

In the current situation, contactless attendance systems are an efficient preventive strategy since they allow for a safe and efficient way of marking student entry in and out. In terms of its most recent version, **facial recognition technology** has made recording student attendance simpler than ever before.

A face recognition attendance system automatically identifies and confirms a person and records attendance based on their face detection.

1.5 Scope

This system can be deployed for verification and attendance tracking at various government offices and corporations. For access control verification and identification of authentic users it can also be installed in bank lockers and vaults. For identification of criminals the system can be used by police forces.

1.6 References

As the Internet is an Ocean of knowledge, we, too, have been helped by the same inter network of systems. We've referenced from many a site to get Information/ for Knowledge Gathering to understand the current scenario of the market, below are the references we have got helped from, and we acknowledge the same:

- https://stackoverflow.com/questions/5412387/face-recognition
- https://towardsdatascience.com/face-detection-in-2-minutes-using-opencv-python-90f89d7c0f81
- https://pyimagesearch.com/2018/06/18/face-recognition-with-opencv-python-and-deep-learning/
- https://www.studocu.com/in/document/rajiv-gandhi-university/software-engineering/face-recognition-based-attendance-system-report-final/35852877

2. Overall Description

2.1 Product Perspective

This product will help in reducing time wastage during conventional class attendance. Secondly, utilizing the latest trends in machine vision to implement a feasible solution for the class attendance 19system. It'll automate the whole process so that we can have a digital environmnet. This will also help in preventing fake roll calls as one to one attendance marking is possible only.

2.2 Product Functions

A Simple tool that can detect faces and mark the attendance automatically.

Face Detection – Detect and locate human faces from a picture and get high precision face bounding boxes.

Face Recognition – Recognizes faces in videos, photos, and the real world, without any glitch.

2.3 Constraints

- The Internet connection is a constraint for the application. Since the application fetches data from the server over the Internet, it is crucial that there is an Internet connection for the application to function.
- The computers must be equipped with web browsers such as Internet explorer.
- All Python code shall conform to the Python Code Convention standards.
- The Camera which is detecting the face is working properly.

2.4 Assumptions and Dependencies

1. The Administrator should provide access to the attendance database in order to mark the attendance of the students.

2. The cameras present in the classroom should transmit feed through the intranet as IP packets

and access should be provided to the same.

3. Specific Requirements

3.1 Interface Requirements

Students will have to register first and give the photo samples to the application and after that admin will be able to login and manage the students data. Once all of this is done when it comes to the main part of attendance, students will come into class and camera will detect their faces and mark the attendance, if it's not able to detect the face it will show no match found or unknown face .

3.2 Functional Requirements

This section outlines the use cases for managing the software.

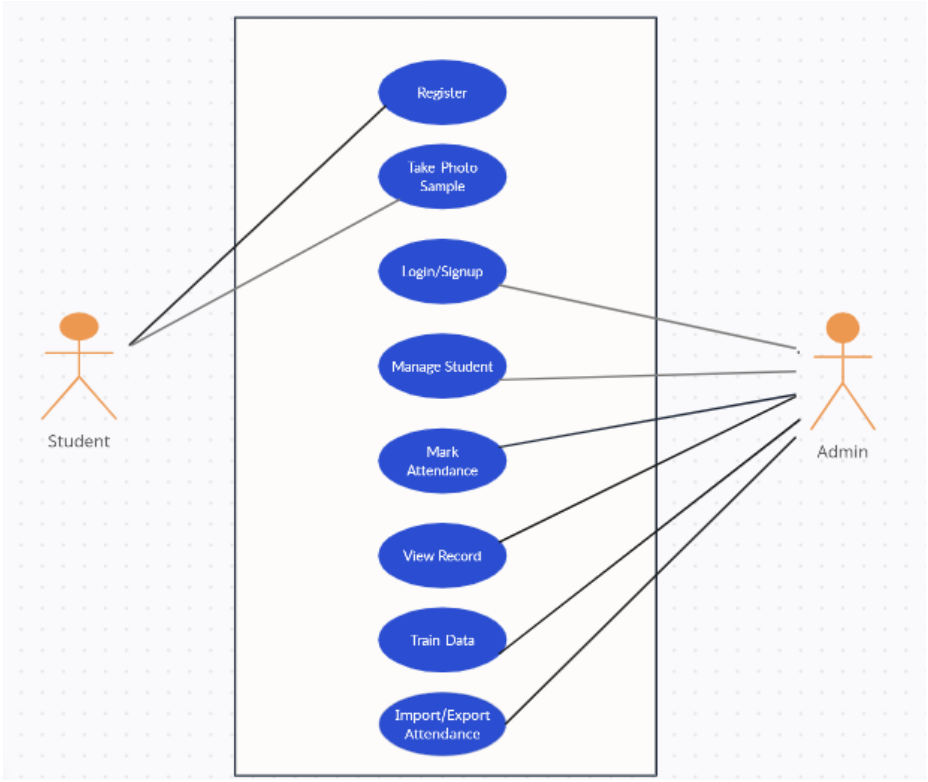

Figure 3.1:- Use Case Diagram

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3.3 Non-Functional Requirements

3.3.1 Performance Requirements

1. The performance of the system should be optimized based on users' device and related running envi- ronment. The response of the system should be reasonable time-based Internet speed and hardware related factors.

2. The system must respond to users' operations depending on the hardware of users' devices and running speed.

3. The system must respond to any actions operated by the user in a visible way.

3.3.2 Design Constraints

In the implementation process of this system, Python Programming Language will be the main development language. Since Python is selected to be the main development language, Python Programming Language Code Convention published by Oracle is chosen as a standard for the development process of the system. In the process of the documentation of the system, IEEE standards will be used and UML standards will be used while designing the diagrams.

Since this system will be a part of a much larger system, it must be portable to this larger system. That’s why portability is one of the most important attributes of this system.

3.3.3 Security

Since the images of students are quite sensitive and involve personal privacy, the system aims to use this information in a safe way. The security of the system is separate to information interaction and information storage.

3.3.4 Usability

The usability non-functional requirements relate to how easy for users to learn about a product's usage, and how effective they are at achieving tasks once they have understood it and how multiple errors they make when they use the product. Here are some aspect describing the usability requirements:

1. Understandability: The system shall be usable, and the interface must be easy to understand.

2. Efficiency: The system should be efficient for everyday use.

3. Learnability: The system shall be easy to learn for both trainees and qualified users of similar systems

4. External Interface Requirement

4.1 Hardware Interfaces

- Laptop with 8gb RAM or above
- Camera 720p or above

4.2 Software Interfaces

- Python del 3.7 version
- Visual Studio Code
- Tkinter

4.3 Communication Interfaces

Our system is a web-based application and hence it does not require much. This system supports Google Chrome & Mozilla Firefox web browsers.

5. Behavioral Model and Description

5.1 Description for Software Behavior

This subsection describes the major events and states of our software. recommendations. First of all, students will need to register in the application and then the camera will take the photos samples of students after that admin will manage and train all the student data . Admin will login the system and according to the detection of face it will mark the attendance of the students and if no match is found it will show an unknown face. Admin can also view the records and import/ export attendance.
This is a very basic and working project on face recognition attendance system.

5.2 Block Diagram

5.2.1 Level 0 Data Flow Diagram

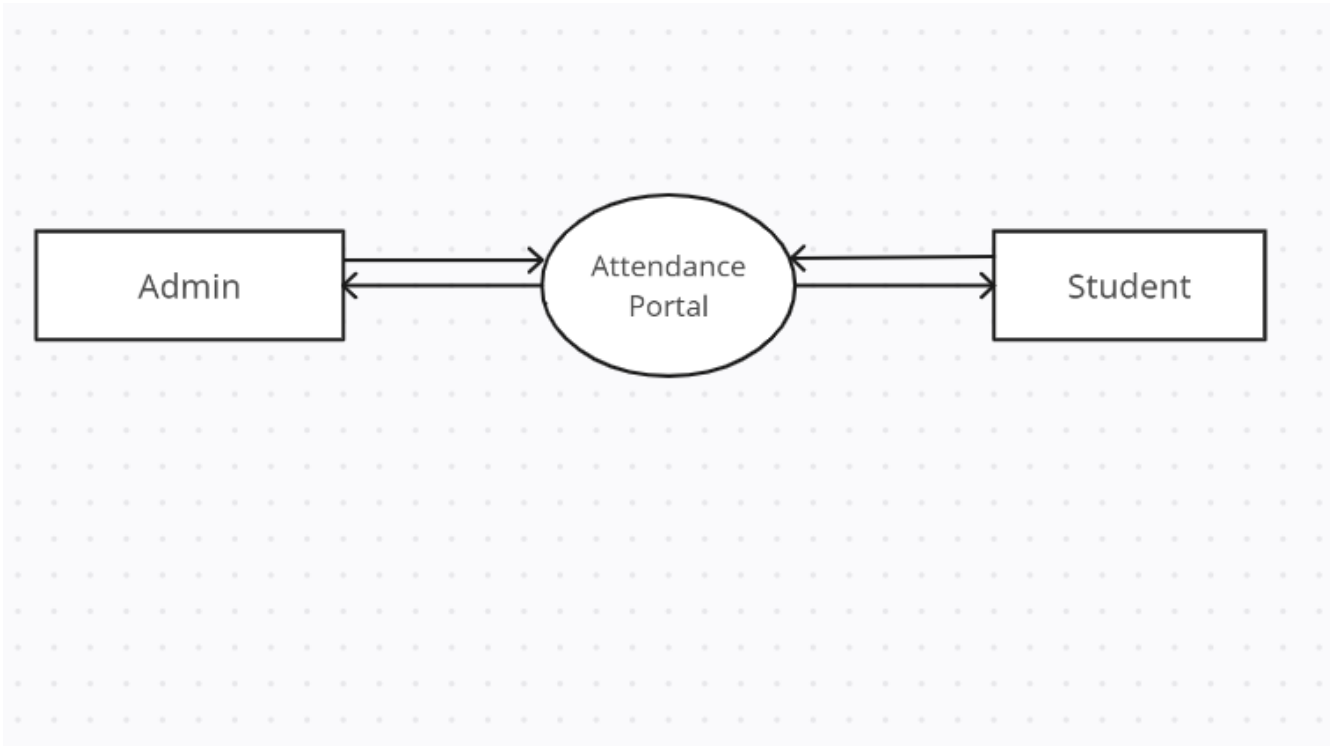

Figure 5.1:- Level 0 Block Diagram

5.2.2 Level 1 Data Flow Diagram(Admin)

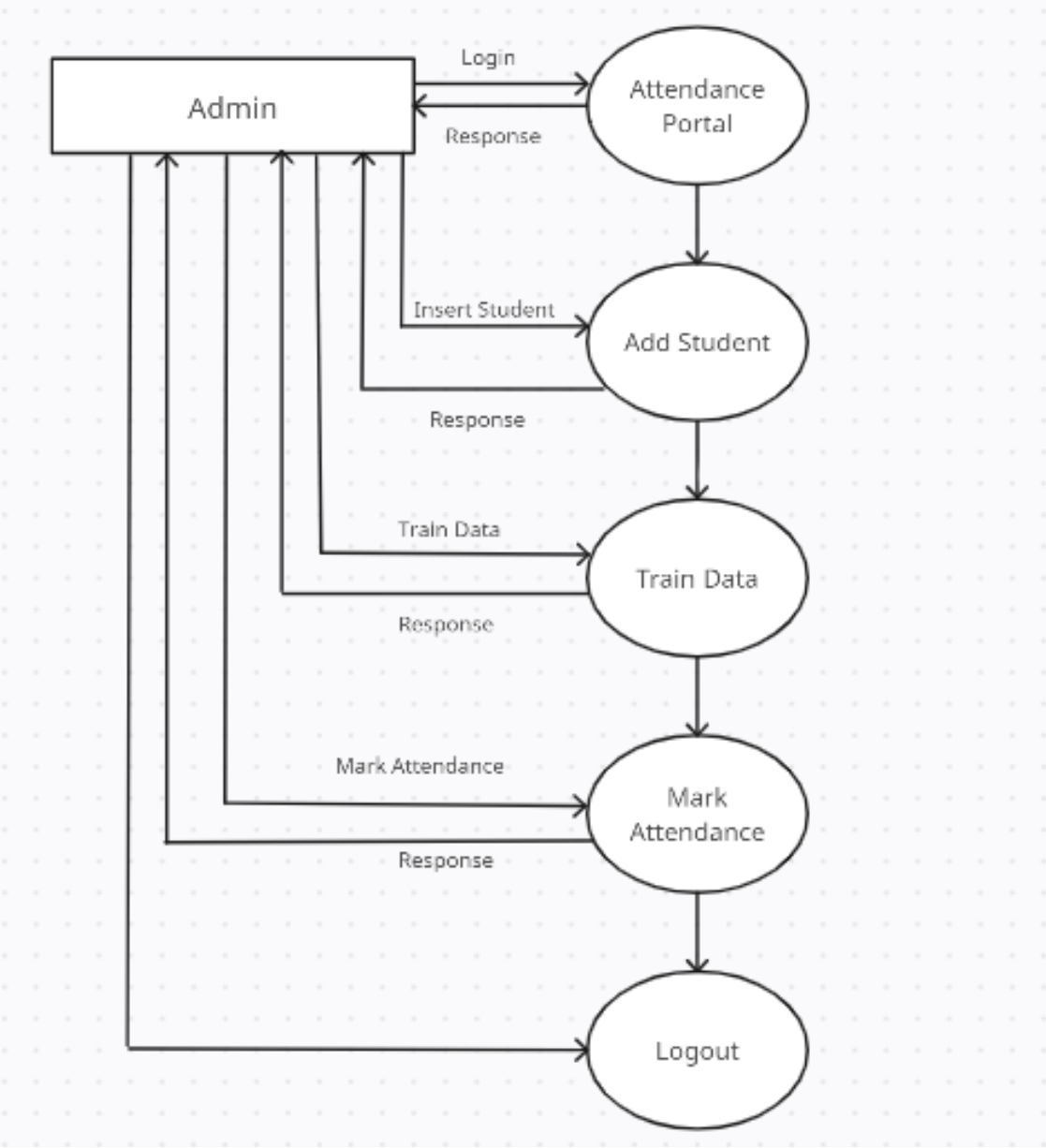

Figure 5.2- Level 1 Block Diagram (Admin)

5.2.3 Level 1 Data Flow Diagram(Student)

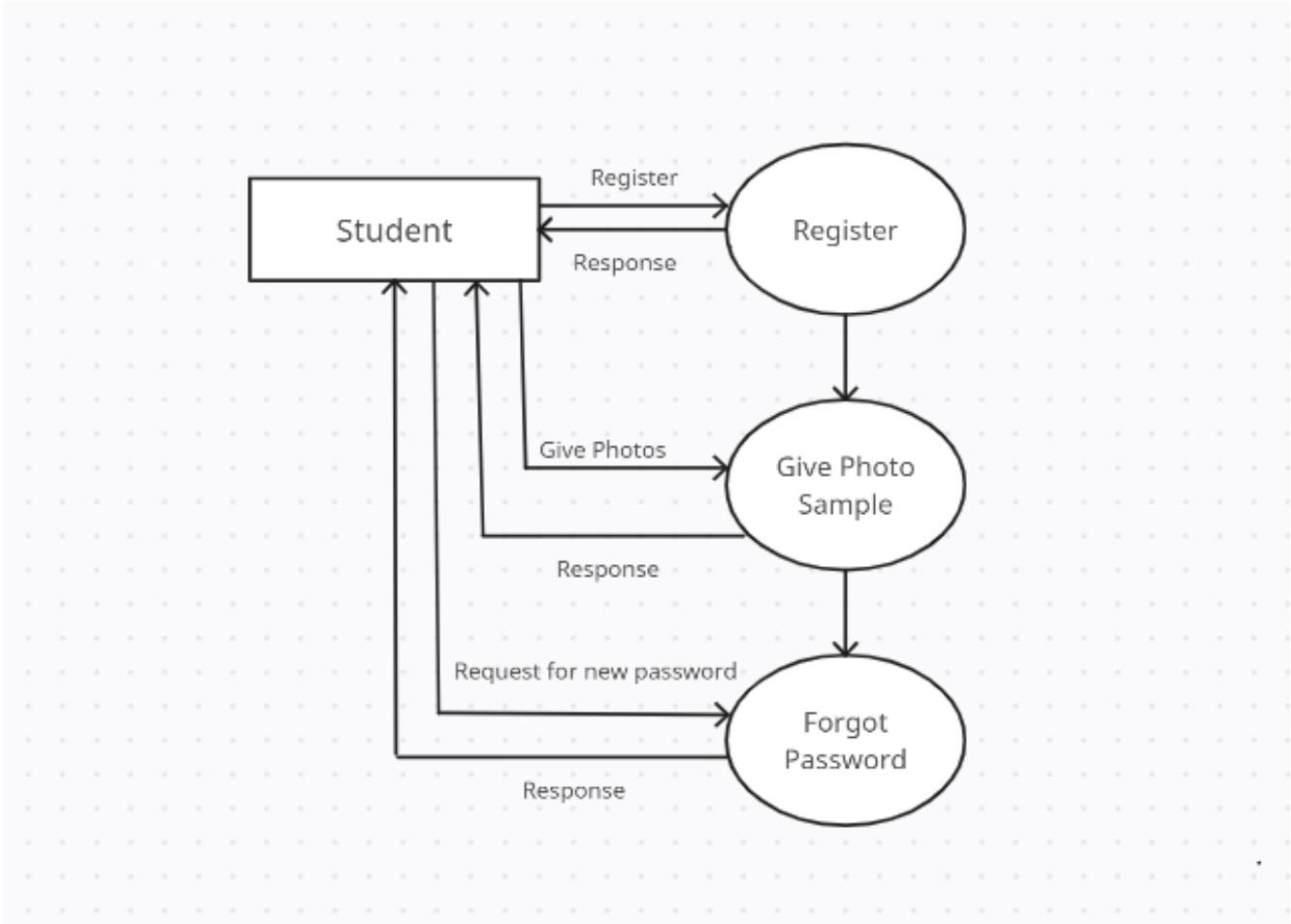

Figure 5.3 - Level 1 Block Diagram (Student)

5.2.4 Activity Diagram

This Activity Diagram describes how activities will be coordinated to provide a service at the time of attendance which can be at different levels of abstraction.

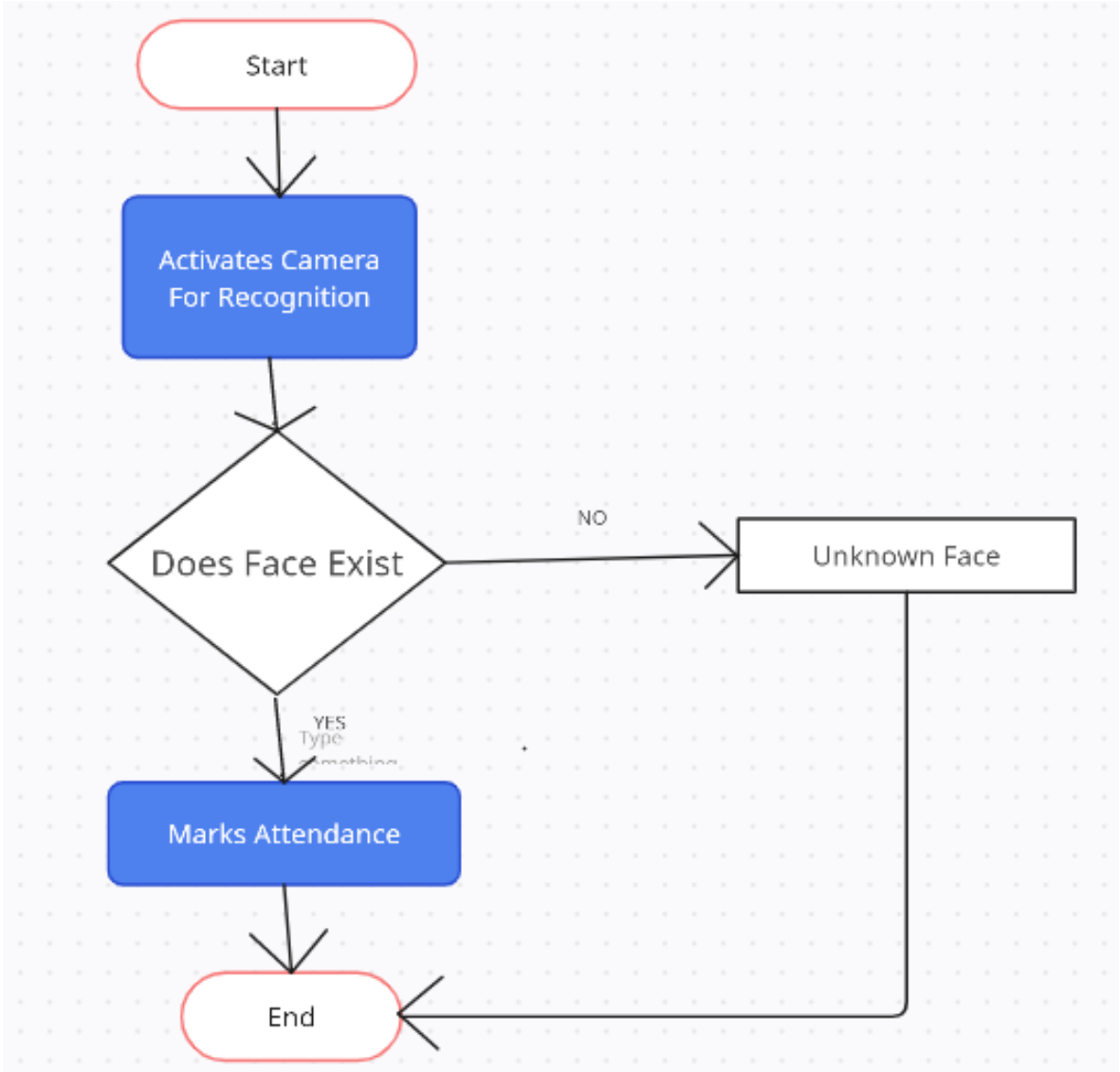

Figure 5.4 :- Activity Diagram

7. Future Scope

Computer vision is still a developing discipline, it has not been matured to that level where it can be applied directly to real life problems. After a few years computer vision and particularly object detection will not be any more futuristic and will be ubiquitous.

The future of facial recognition technology is bright. Forecasters opine that this technology is expected to grow at a formidable rate and will generate huge revenues in the coming years. Security and surveillances are the major segments which will be deeply influenced. Other areas that are now welcoming it with open arms are private industries, public buildings, and schools. It is estimated that it will also be adopted by retailers and banking systems in coming years to keep fraud in debit/credit card purchases and payment especially the ones that are online. This technology would fill in the loopholes of the largely prevalent inadequate password system. In the long run, robots using facial recognition technology may also come to foray. They can be helpful in completing the tasks that are impractical or difficult for human beings to complete.

For now, we can consider object detection as a sub-branch of machine learning.