REUNITE

A PROJECT REPORT

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CONTENT

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CERTIFICATE

Certified that this project report **"REUNITE"** is the original work of **"BHUMIKA SINGH, AMAN GUPTA, DEEPANSHU GUPTA, JATIN GUPTA, JYOTI GUPTA"** students(s) of B. Tech. Final Year VIII Semester (*Computer Science Branch)* who carried out the project work under my supervision.

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ABSTRACT

The protection of children/person in difficult circumstances is a fundamental issue that must be addressed. The vulnerability of these individuals to abuse, neglect, exploitation, abandonment, and separation requires an effective system that can quickly and accurately identify them and provide the necessary support to ensure their well-being. To address this issue, we have developed a facial recognition application that uses a deep learning-based algorithm to identify missing children/person and prevent their further victimization.

Our facial recognition application is designed to be user-friendly, enabling the public to upload a picture of a suspicious child/person to a common portal along with their details. The uploaded picture is automatically compared with the registered photos of missing children/person from the database, making it easier for the authorities to locate and rescue them. The use of facial recognition technology significantly improves the speed and accuracy of this process, allowing for more timely and efficient identification of missing children/person.

Our deep learning-based algorithm is designed to be highly accurate and invariant to noise, illumination, contrast, occlusion, image pose, and age of the child. The algorithm uses a high-level feature extractor that outperforms earlier methods in facial recognition-based missing child identification. The use of deep learning technology enables the algorithm to learn from a large dataset of facial images of missing children/person and non-missing children/person, ensuring that it is highly effective in recognizing the unique facial features of each individual.

In addition to its use in identifying missing children/person, our facial recognition application can also be used to prevent their victimization. By detecting and reporting suspicious individuals who may be attempting to abduct or harm children/person in difficult circumstances, the application can help prevent such incidents from occurring. This proactive approach to child/person protection is a critical step towards reducing the vulnerability of these individuals and ensuring their well-being.

It is important to note that while the use of facial recognition technology can significantly improve the identification of missing children/person, it also raises important ethical and privacy concerns. Our application is designed with strict safeguards in place to protect the privacy and security of the data, ensuring that the facial recognition technology is used in a responsible and ethical manner.

In conclusion, our facial recognition application represents an important step towards the protection of children/person in difficult circumstances. By providing a user-friendly platform for the public to upload pictures of suspicious individuals, our application makes it easier for authorities to quickly identify missing children/person and prevent their victimization. With its highly accurate deep learning-based algorithm, the application can significantly improve the speed and efficiency of this process, ultimately contributing to the well-being of these vulnerable individuals.

Chapter-1

INTRODUCTION

This chapter will outline the aims and motivation behind the project and a general overview of both the project itself and this report.

1.1 Problem Description

In India a countless number of children are reported missing every year. Among the missing child cases a large percentage of children remain untraced.

Each year police receive numerous reports of missing persons. The people may go missing for any reasons. Some of them return soon after their disappearance without any harm having befallen them. However, some of them might have been met with tragic end such as homicide, suicide or an accident. It is also possible that they might have been a victim of foul play such as trafficking. However, it is difficult to ascertain whether someone's disappearance is intentional or unintentional.

The human trafficking may include male and female, adults as well as children. The human trafficking may take place within country as well as transnational crime. It includes labour and sexual exploitation of the victim. The literature review reveals that boys as exploited as camel jockeys and girls and women are trafficked as sexual exploitation. The literature review also shows that low level of education, low employment prospects and lack of opportunities are also the reasons for women and men to venture out in search of better living conditions.

1.2 Motivation

Tracking the thousands of people who disappear each year in the 1.3-billion-person nation is an impossibly enormous undertaking. According to India's Ministry of Women and Child Development, more than 240,000 people were reported missing between 2012 and 2017 alone, although the real number is probably higher. Some organization estimate that the true number of missing people is close to 500 000 per year.

1.3 Objectives

The objective of this project was to develop a system through which a citizen can check whether an unattended child is a missing person. In this system we developed a mobile application for the users through which any user can check weather an unattended / suspicious person is missing person based on the database that fed by individual user.

To accomplish this above objective, we divided it as follows:

1. Users can raise a complaint through the system for missing children/persons.
2. Users can check whether an unattended/suspicious child/person is a missing child/person from our database using facial Recognition technology.

1.4 Project Overview

For this project we looked through the several research paper for finding the best model available for face comparison. Among all these VGG-

FACE deep learning has the highest accuracy. So we decided to use this model to create API for comparing two faces.

However, for interaction with this API we created a mobile application which would allow the users to simply take a picture of the person and upload it, and the application would call the API and fetch the real time comparison result for all the images with their threshold values greater than 0.8 and the application would display the result with relevant information.

Chapter-2

LITERATURE REVIEW

2.1 Statistics

Multiple independent surveys by the Government and the non-governmental organizations have reported the number of missing children in India and the numbers are not very pleasing. As per the annual report "Crime in India" 2019 by the National Crime Records Bureau (NCRB), a total of 73,138 children were reported missing last year and the growth is exponential.

1. Every eight minutes, a child goes missing in India. 7 8 in an hour, 180 in a day and 65,700 a year.
2. Around 9 percent per annum increase .ln 2018, the total number of 67,134 children were reported missing and it had increased by 8.9
3. World's second largest population and fourth longest railway network. Railway Children an International Organization that creates a sustainable environment for children of the streets stated that every 5 minutes a child lands up unaccompanied on railway stations who might have run from home or lost from his/her parents.
4. 'Thousands of missing children kidnapped from India's railway network annually" Sealdah Railway Station, Kolkata has one of the highest records of child abduction numbers. In 2015, the total child abduction record reached up to 41 893
5. Lockdown- Covid and Children. On 24th March 2020, Prime Minister Modi had declared the first pandemic lockdown and since then till the lockdown upliftment up to 1 August 2020, there have been 3376 missing children's cases.

2.2 Related Works

S. AYYAPPAN from IFET College of Engineering[6] They use a layered convolutional auto encoder and facial feature extraction and matching based on deep learning in their suggested solution (SCAE). A database contains the photos of the missing people. From those photographs, faces are recognised, and a convolutional neural network picks up features.
A multi-class SVM classifier was trained using these newly acquired characteristics. They successfully labelled and identified the child using this technique. The primary distinction between our approach and theirs is that we intend to compile a dataset of lost persons with the help of people who want to contribute to society (voluntary work). And their system involves complex algorithms which make the process of extraction and classification slower.

Rohit Satie[7] A paper on the use of Principal Component Analysis (P CA) to build a face recognition system. The computational complexity of the PCA method and the fact that it can only analyse faces with comparable facial expressions are its two key limitations

Maharashtra Police[9] Govt. of Maharashtra has a website made available for the citizens so that they can find the status of any missing person whose complaint has been registered in the police station inside Maharashtra. ln their application, only Admin and some trusted people like police, etc., can update the data set continuously.

Government of India Khoya Paya Scheme Khoya[10] -Paya Citizen's Corner for tracking children is a national-level government website wherein a person can register a complaint about a missing child or inform the whereabouts of a missing child. there are some restrictions on making a minor's image publicly available, so not all missingchildren's images would be available.

National Centre for Missing Children[11] A non-governmental initiative for creation of a national database for missing children, but seems inoperative.The complaints of missing children are piling up on the law enforcement's desks and the resources available at their hands are very limited.

The Eye-Opener Delhi Police Initiative[12] Delhi Police conducted a Facial Recognition Trial on around 45 000 missing children and out of the total children scanned 2,390 children could be identified between 6th to 10th April. In their application, only Admin and some trusted people like police, etc., can update the data set continuously.

Missing child identification using face recognition system[13] This paper addresses the building of face recognition system by using Principal Component Analysis (P CA) method. The PCA has been extensively employed for face recognition algorithms. The computational complexity of the PCA method and the fact that it can only analyse faces with comparable facial expressions are its two key limitations.

Birari Hetal from Late G.N. Sapkal College of Engineering [14] He had also deal with the similar problem statement and objective. They have made the Android application for making the task of missing person easier. The Android Application proposed by them makes use of SWFSIFT algorithm for comparing two images. In their application, only Admin and some trusted people like police, etc., can update the data set continuously.

The main difference between their system and our system is that we are going to allow application users for uploading images (update data sets) of suspicious peoples like child beggars whom they think that they are missing. Although the images uploaded by that particular user is not viewed on our application. So we are trying to keep that data in safe hands.

2.3 Our Flow:

- Presentation Layer: The front-end component is in charge of offering transportable presentation logic. A thin client will be a mobile device. The application will be on the phone. When adding a complaint, the user will interact with the application and send the data to the online service.
- Transportation Layer: The client's request is transmitted to the database by the business layer function (API) that exists between the presentation layer and the database layer. Data from the client will be fetched by the APIs, processed, and then stored in the database. APIs serve as a bridge between databases and applications.
- Database Layer: All information must be stored in a specific format in the database. Additionally, it responds to client issued requests to add,

update, remove, or search records. We used Python and a data Bases in our project to store information.

2.4 Proposed System Over Existing System:

- Simple to view and upload complaints.
- Any trusted user may add a complaint.
- Simple GUI.
- Easily readable information.

Chapter-3

DEEP LEARNING

Deep learning is a class of machine learning algorithms that uses multiple layers to progressively extract higher-level features from the raw input. For example, in image processing, lower layers may identify edges, while higher layers may identify the concepts relevant to a human such as digits or letters or faces.

3.1 Introduction

In today's world, the use of advanced technology has become an integral part of our lives. With the rise of artificial intelligence, computer vision, and deep learning, many complex problems have been solved with greater accuracy and efficiency. One such application of these technologies is in the field of face detection and recognition, which has gained immense popularity in recent years. The ability to detect and recognize human faces has been widely used in many areas such as security, surveillance, biometrics, and even entertainment.

In this, we will discuss the application of deep learning techniques in the development of an app that uses face detection and recognition for finding missing persons. The app will use a database of images to identify the missing person and provide relevant information to the authorities. The app will also have features such as facial recognition, which will help in identifying the person in real-time.

The use of deep learning algorithms has revolutionized the field of computer vision and has significantly improved the accuracy and speed of face detection and recognition. With the help of these algorithms, it is possible to identify individuals with greater precision, even in low light conditions, and from different angles.

The purpose of this chapter is to provide an overview of the technologies and methodologies used in the development of this app. We will discuss the different stages involved in building the app, including data collection, pre-processing, model selection, and evaluation. We will also explore the challenges faced during the development of the app and the possible solutions to overcome them.

3.2 Face Detection And Face Recognition

Face detection and recognition are two closely related but distinct techniques that have become increasingly important in the field of computer vision.

3.2.1 Face Detection

Face detection is the process of identifying human faces in digital images or videos. The goal is to locate and extract the face region from the rest of the image. Face detection algorithms typically use machine learning models to identify specific facial features such as eyes, nose, and mouth. These algorithms can detect faces in various lighting conditions, orientations, and backgrounds.

3.2.2 Face Recognition

Face recognition is the process of identifying or verifying the identity of an individual by comparing their facial features to a database of known faces. The goal is to determine if a particular face matches a face in the database. Face recognition algorithms use machine learning models to create a face signature or template for each individual, which is then compared to the templates in the database.

3.3 Working Of Face Detection System

A face detection system typically uses a machine learning algorithm to detect and locate faces in an image or video. The process involves the following steps:

MTCNN (Multi-Task Cascaded Convolutional Networks) is an approach for face detection that was introduced in a 2016 paper by Zhang et al. It is a popular deep learning-based method for face detection and has achieved state-of-the-art results on several benchmarks.

MTCNN uses a cascaded framework to detect faces at different scales. The framework consists of three stages:

The first stage is a proposal network that generates a set of candidate face regions (bounding boxes) in the input image. The proposal network uses a shallow CNN (convolutional neural network) to generate a set of bounding box proposals, each of which is associated with a score that indicates the likelihood of the box containing a face.

The second stage refines the candidate face regions generated by the first stage. It uses a deep CNN to perform face/non-face classification and bounding box regression. The output of this stage is a set of refined face region proposals with improved accuracy.

The third stage further refines the candidate face regions by using a facial landmark regression network. This stage estimates the positions of facial landmarks (e.g., eyes, nose, and mouth) in the candidate face regions, which can be used to align the faces for further processing.

MTCNN is a popular approach for face detection because it is capable of detecting faces with high accuracy and can handle faces at different scales. It is also able to detect faces under challenging conditions, such as when faces are partially occluded or rotated. Additionally, MTCNN is computationally efficient and can run in real-time on standard hardware.
In summary, MTCNN is a multi-stage deep learning-based approach for face detection that is capable of detecting faces with high accuracy and can handle faces at different scales and challenging conditions

ACE detection and alignment are essential to many face applications, such as face recognition and facial expression analysis. However, the large visual variations of faces, such as occlusions, large pose variations and extreme lightings, impose great challenges for these tasks in real world applications. The cascade face detector proposed by Viola and Jones [2] utilizes Har-Like features and AdaBoost to train cascaded classifiers, which achieves good performance with real-time efficiency. However, quite a few works [1, 3, 4] indicate that this kind of detector may degrade significantly in real-world applications with larger visual variations of human faces even with more

advanced features and classifiers. Besides the cascade structure, [5, 6, 7] introduce deformable part models (DPM) for face detection and achieve remarkable performance. However, they are computationally expensive and may usually require expensive annotation in the training stage. Recently, convolutional neural networks (CNNs) achieve remarkable progresses in a variety of computer vision tasks, such as image classification [9] and face recognition [10]. Inspired by the significant successes of deep learning methods in computer vision tasks, several studies utilize deep CNNs for face detection. Yang et al. [11] train deep convolution neural networks for facial attribute recognition to obtain high response in face regions which further yield candidate windows of faces. However, due to its complex CNN structure, this approach is time costly in practice. Li et al. [19] use cascaded CNNs for face detection, but it requires bounding box calibration from face detection with extra computational expense and ignores the inherent correlation between facial landmarks localization and bounding box regression.

Face alignment also attracts extensive research interests. Researches in this area can be roughly divided into two categories, regression-based methods [12, 13, 16] and template fitting approaches [14, 15, 7]. Recently, Zhang et al. [22] proposed to use facial attribute recognition as an auxiliary task to enhance face alignment performance using deep convolutional neural network.
However, most of previous face detection and face alignment methods ignore the inherent correlation between these two tasks. Though several existing works attempt to jointly solve them, there are still limitations in these works. For example, Chen et al. [18] However, most of previous face detection and face alignment methods ignore the inherent correlation between these two

tasks. Though several existing works attempt to jointly solve them, there are still limitations in these works. For example, Chen et al. [18] jointly conduct alignment and detection with random forest using features of pixel value difference. But, these handcraft features limit its performance a lot. Zhang et al. [20] use multi-task CNN to improve the accuracy of multi-view face detection, but the detection recall is limited by the initial detection window produced by a weak face detector.

In [19], multiple CNNs have been designed for face detection. However, we notice its performance might be limited by the following facts: (1) Some filters in convolution layers lack diversity that may limit their discriminative ability. (2) Compared to other multi-class objection detection and classification tasks, face detection is a challenging binary classification task, so it may need less numbers of filters per layer. To this end, we reduce the number of filters and change the 5><5 filter to 3><3 filter to reduce the computing while increase the depth to get better performance. With these improvements, compared to the previous architecture in [19], we can get better performance with less runtime (the results in training phase are shown in Table I. For fair comparison, we use the same training and validation data in each group).

Our CNN architectures are shown in Fig. 2. We apply PReLU [30] as nonlinearity activation function after the convolution and fully connection layers (except output layers).

A major milestone in the development of facial recognition techniques was achieved by the introduction of highly accurate deep learning methods such

as Deep Face ad Deeply For the first time, face verification in unconstrained settings was achieved with accuracy surpassing human ability. This development was only allowed for by the advent of significant improvements in hardware, such as high-capacity GPUs. Since then, the majority of research has focused on the development of deep learning-based methods which attempt to model the human brain, via high-level abstraction achieved using a concurrence of non-linear filters resulting in feature invariance.

3.4 Working Of Face Recognition System

Neural networks have revolutionized many areas of machine intelligence, enabling superhuman accuracy for challenging image recognition tasks. However, the drive to improve accuracy often comes at a cost: modern state of the art networks requires high computational resources beyond the capabilities of many mobile and embedded applications.

This paper introduces a new neural network architecture that is specifically tailored for mobile and resource constrained environments. Our network pushes the state of the art for mobile tailored computer vision models, by significantly decreasing the number of operations and memory needed while retaining the same accuracy.

Our main contribution is a novel layer module: the inverted residual with linear bottleneck. This module takes as an input a low-dimensional compressed representation which is first expanded to high dimension and filtered with a lightweight depth wise convolution. Features are subsequently projected back to a lowdimensional representation with a linear convolution.

This module can be efficiently implemented using standard operations in any modern framework and allows our models to beat state of the art along

3.5 Deployment Of Model In Mobile

Here are the steps to deploy face recognition and face detection models on a mobile phone in React Native using the react-native-pytorch-core package.

3.5.1 Prepare Custom Model

To prepare a custom PyTorch model to integrate it in a react native app.

This section will how to export a ScriptModule with model weights for the PyTorch Mobile Lite Interpreter runtime, which is used by PlayTorch to run inference with ML models

3.5.2 Adding The Face Detection Step

The original sample comes with other DL model and it computes the results in one single step. For this app, we need to implement several steps process. Most of the work will consist in splitting the detection, first the face detection and second to the face recognition. For the face detection step we are going to use our mtcnn face detection model.

When the project finished sync, we are ready to use the Face Detector into our Detector Activity. The face detector is created with options that prioritize the performance over other features (e.g., we don't need landmarks for this application).

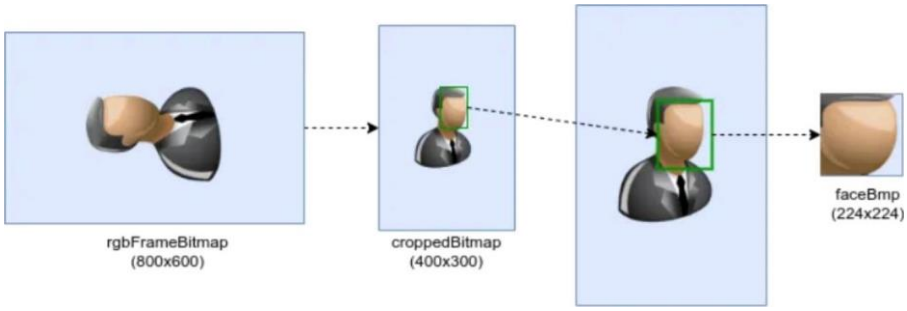

Figure 3.1: Face detection is done using cropped Bitmap

When the faces are detected, the original frame is drawn in the portrait MP bitmap. For each detected face, its bounding box is retrieved and mapped from the cropped space to portrait space. This way we can get a better resolution image to feed the recognition step. Face cropping is done by translating the portrait bitmap to the face's origin and scaling to match the DNN input size.

3.5.3 Adding The Face Recognition Step

First we need to add the Pytorch Lite model (.ptl) that we create above file to the assets folder of the project:

And we adjust the required parameters to fit our model requirements in the Detector Activity configuration section. We setthe input size of the model to INPUT SIZE = 112, and IS QUANTIZED = false.

Let's change the name of the Classifier interface to Similarity Classifier since now what the model returns is similarity, its behaviour is a little different. It allows us to register recognition items in the dataset. We rename the confidence field as distance, because having confidence on the Recognition definition would require do something extra stuff. By now, we are going to use just distance as a measure of similarity, in this case it is the opposite to

confidence (the smaller the value, the surer we are that the recognition is from the same person), for example, if value is zero it is because it is exactly the same image.

Now, let's change the model implementation, by now we implement our dataset in the simplest possible way, that is a dictionary that stores the name of the person and its recognition (which has the embeddings). The recognize image method, is modified to retrieve the embeddings, and if necessary, store them into the recognition result, when we have the embedding, we just look for the nearest neighbour embedding into the dataset by performing a linear search.

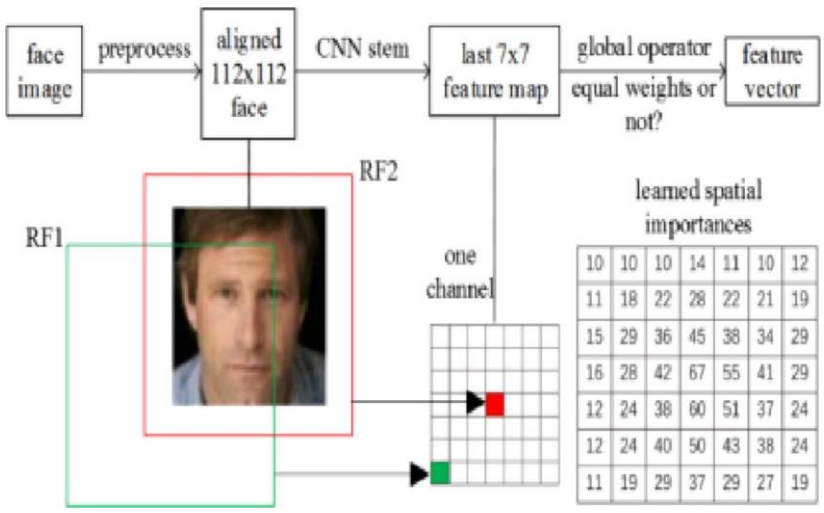

Figure 3.2: Face embedding is done on the cropped Bitmap

Chapter-4

DESIGN AND IMPLEMENTATION

This chapter will outline design choices and how we implemented the complete system which includes mobile application, admin panel, API. First, we will talk about the development of the mobile application itself, then will move onto individual techniques used for different parts of it.

4.1 Designing Approach

To allow for future expansion and integration of the app by individual users, REUNITE was designed using a modular design process. The current design consists of four main modules: a frontend UI for mobile app, a middleware communication module, a frontend UI for admin panel, and a database module.

Most applications are user-centred which makes the user interface (UI) design an essential part of the app. Graphical user interfaces (GUI) are in most cases specific to the platform and often only covered by the default appearance defined by the framework.

A user makes requests and updates by connecting to the frontend user interface, and the middleware receives all actions from the user and passes them to the backend, which responds to the user's request and sends an appropriate response through the middleware back to the user on the frontend. The following sections provide details on each module.

4.2 Architecture Prototype

Mobile app architecture refers to a set of rules, techniques, processes, and patterns to develop a mobile application. These rules help developers create an app that meets both the business requirements as well as industry standards.

The mobile app architecture is made up of all the parts of the app all the questions about why, what, how including what data is collected, how the data moves, what the app looks like, for what platform, using what tech stack.

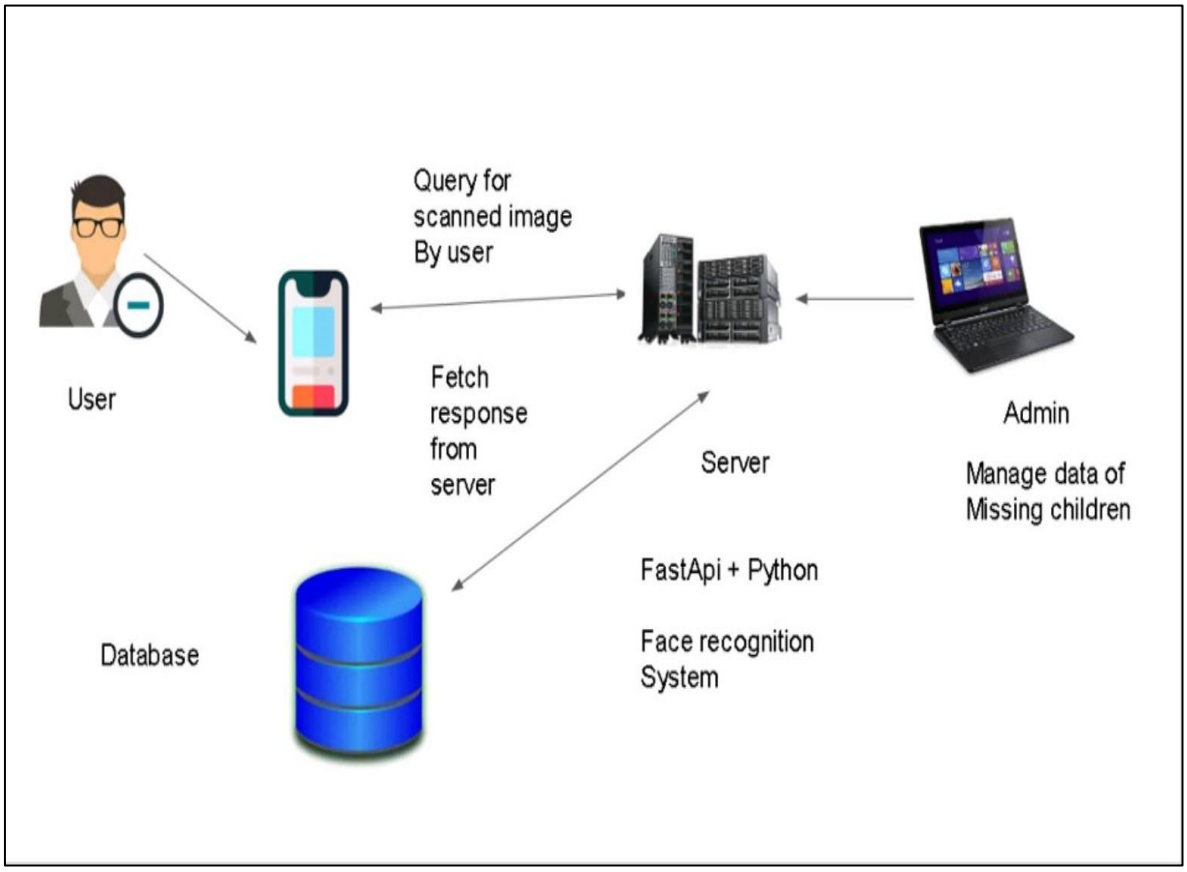

Figure 4.1: The interactions and flow of information between these modules.

4.3 Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency

Activity Diagrams describe how activities are coordinated to provide a service which can be at different levels of abstraction. Typically, an event needs to be achieved by some operations, particularly where the operation is intended to achieve a number of different things that require coordination,
or how the events in a single use case relate to one another, in particular, use cases where activities may overlap and require coordination. It is also suitable for modelling how a collection of use cases coordinates to represent business workflows.

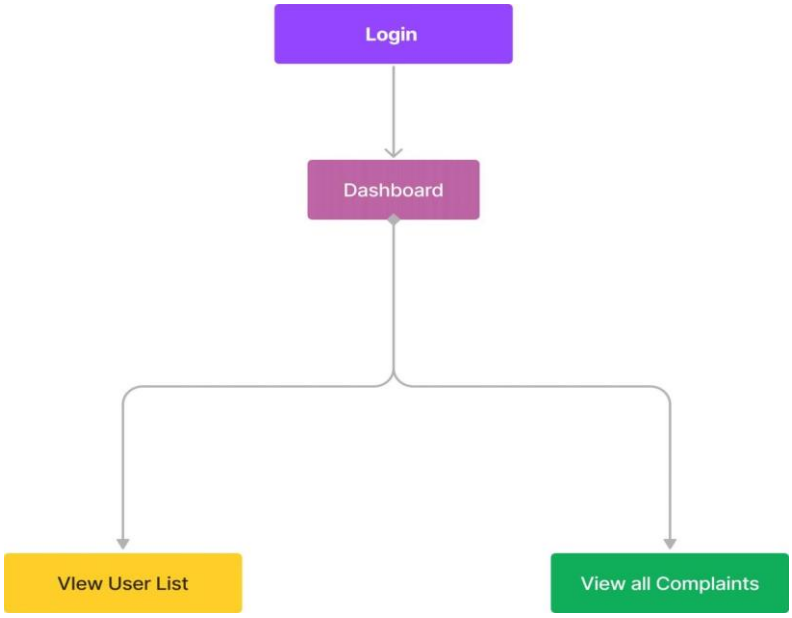

Figure 4.2: Activity diagram of admin panel

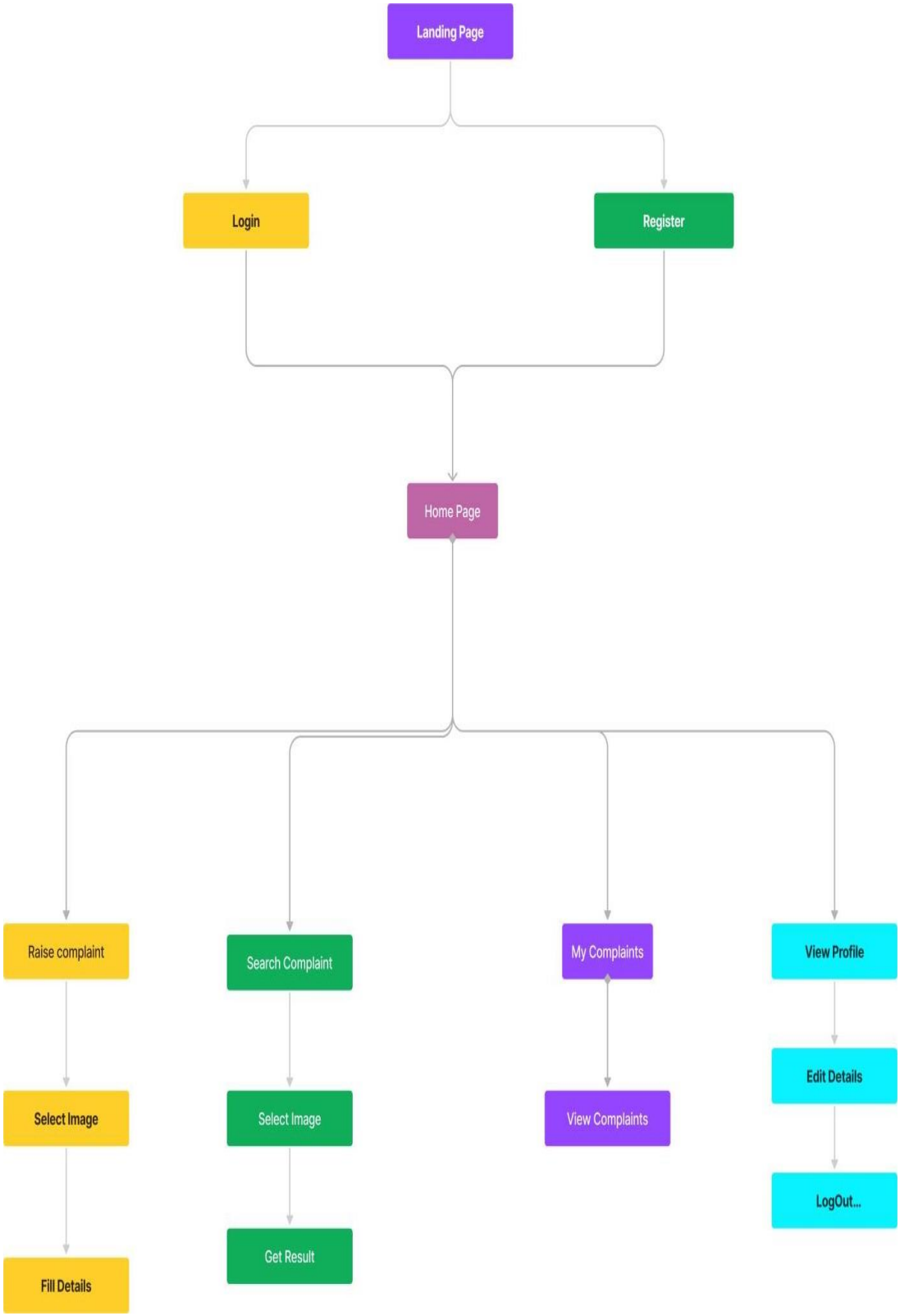

Figure 4.3: Activity diagram of mobile application

4.4 Use Case

use case diagram is a graphical depiction of a user's possible interactions with a system. A use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. The use cases are represented by either circles or ellipses. The actors are often shown as stick figures.

In this section we describe the use case of our system. Mainly two types of users are used this system.

4.4.1 User

User needs to enter the username and password to get login and then user will upload the photo of the missing person. User scan / upload image for finding detail of that child. After that user will get response

4.4.2 Admin

Admin will login to admin panel. Admin will monitor the list of user and complaint updated in the database.

4.5 Mobile App Developements

The development of Android applications is done using the React Native command line interface, a JDK, and Android Studio, Visual Studio Code (IDE). React Native CLI is the way to develop to developed hybrid app. This requires Node.js environment to setup the environment.

This SDK comes with all the necessary development tools needed, including all the relevant libraries, a debugger and an Android emulator. The main platforms which are currently supported for development or Android are any modern desktop Linux distribution, Windows XP or later, and Mac OS X 10.5.8 or later.

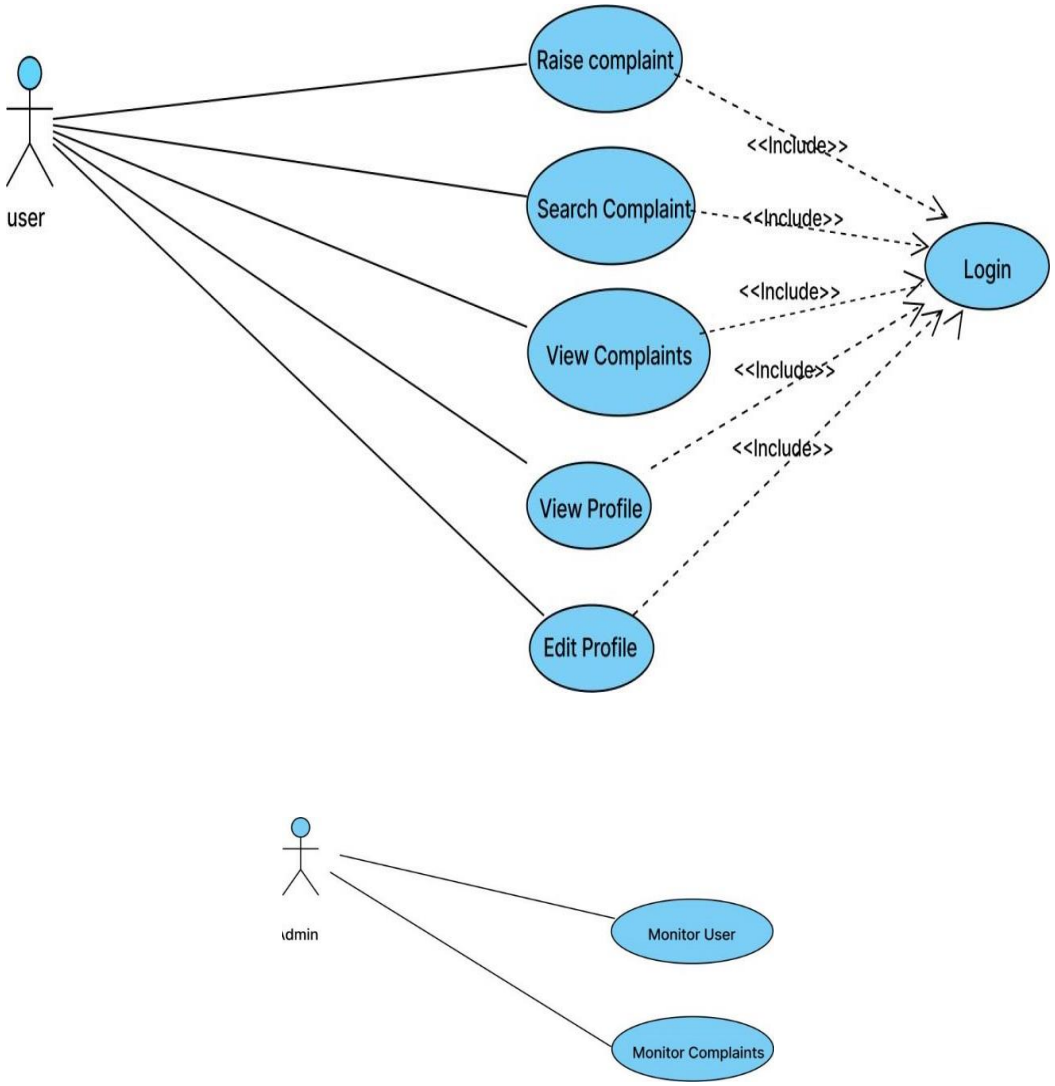

Figure 4.4: User case diagram of mobile application

Use case diagram of our system The languages used in Android development are JavaScript. JSX is used for both the front-end design and layout of the pages, and for the general configuration of the application.

4.6 Mobile Application Layout

Mobile applications in React Native have functional components through the use wo which we can create different layouts. Functional component is essential for the different pages that you would see. Each of these have both a JSX and styles. For communication with API different methods are available like axios, fetch, xhr. But in this we use fetch for communicating with the APIs.

4.6.1 Authentication Layout

Authentication technology provides access control for systems by checking to see if a user's credentials match the credentials in a database of authorized users or in a data authentication server. In doing this, authentication assures secure systems, secure processes and enterprise information security. For this purpose, we design two screens Signup screen and Login screen.

Login Screen

This is a very basic authentication screen. It is what gets displayed when the user first opens the app. When the user enters email address and password and

press submit button, the function will call which validate all the fields email and password.

Email validation is done by using regex expression a behind-the-scenes. After validation if entries found to be correct it calls the login API which return the user data along with key which acts as a access token. Otherwise, it displays the error to the user. After successful retrieving user data, it gets saved to the Async Storage which can be used further for calling the API that required access token.

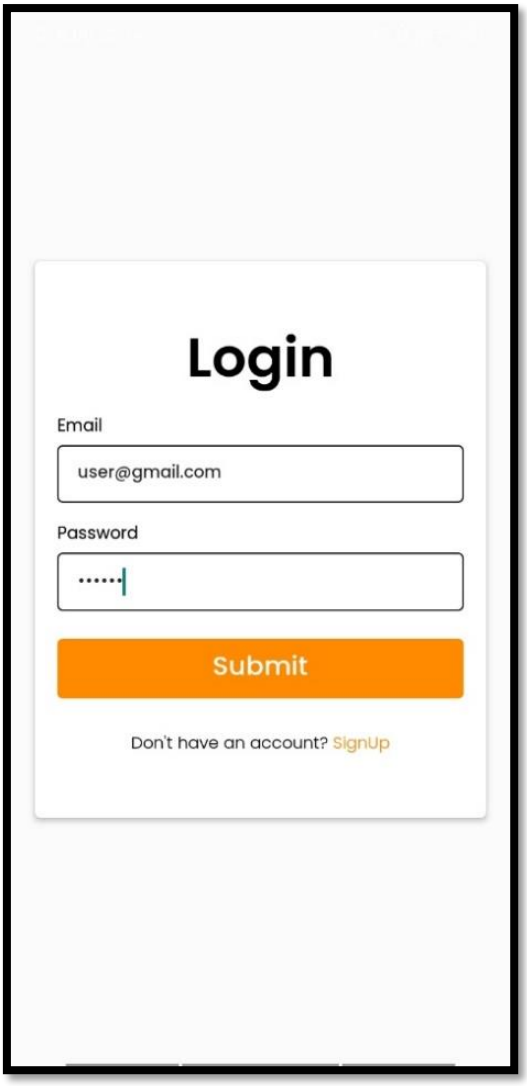

Figure 4.5: Screenshot of Login Scree

SIGNUP SCREEN

This is also very basic authentication screen. It is what gets displayed whenthe user clicks on signup button through the login screen. When the user enters his details such as name, email address, password and confirm password and press submit button, the function will call which validate allthe fields email and password.

After validation if entries found to be correct it calls the register API which return the user data along with key which acts as an access token. Otherwise, it displays the error to the user. After successfully retrieving user data it gets saved to the Async Storage which can be used further for calling the API.

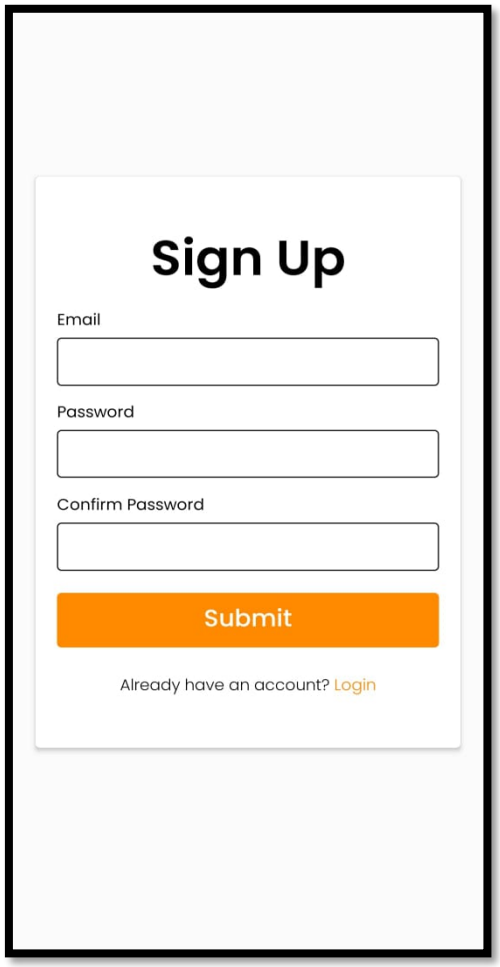

Figure 4.6: Screenshot of Signup Screen

4.6.2 Home Screen

This consist of option like Raise a complaint, Search a complaint and My complaint. At the bottom of this screen Bottom Navigation Bar was also there which is used to navigate between home screen and profile screenBy selecting one of the above option users will redirect to the desired screen.

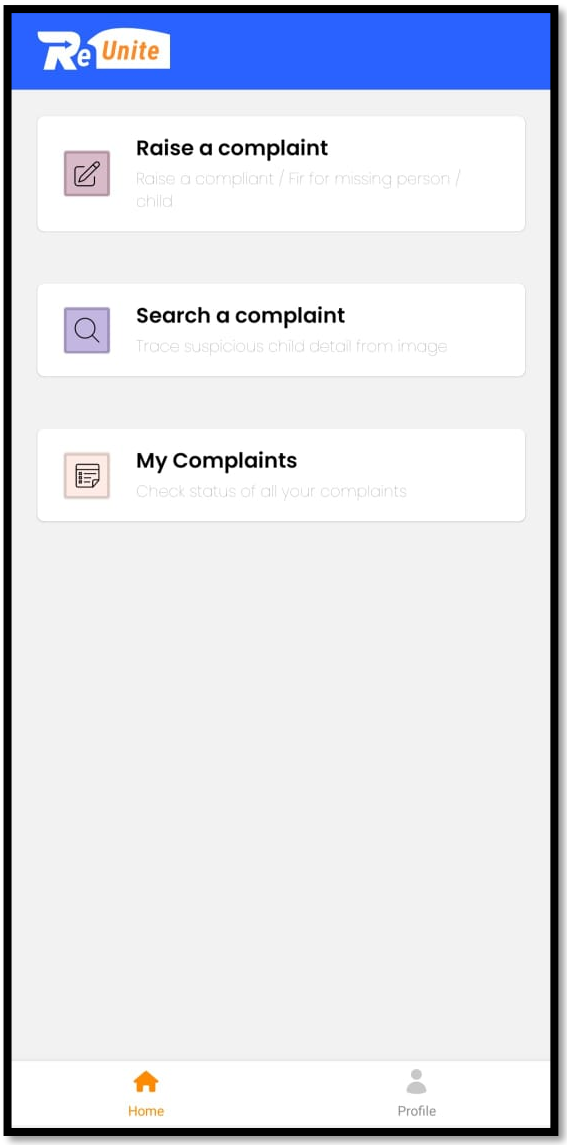

Figure 4.7: Screenshot of Home Screen

4.6.3 Profile Screen

Before raising the complaint from home screen user first have to complete their profile so that when any user searches its information reflected.

It also consists logout option also by clicking it is data store in async storage will be removed and it will redirect to login screen.

Figure 4.8: Screenshot of Profile Scree

4.6.4 Image Picker Component

This is a functional component which is shown on setting the global image state. This is a common component which is used by profile screen, raise complaint screen and search screen for selecting the images. It consists of two options for selection of images either from camera or from gallery. After selecting the image, it will be included in form data that will be passed to the API.

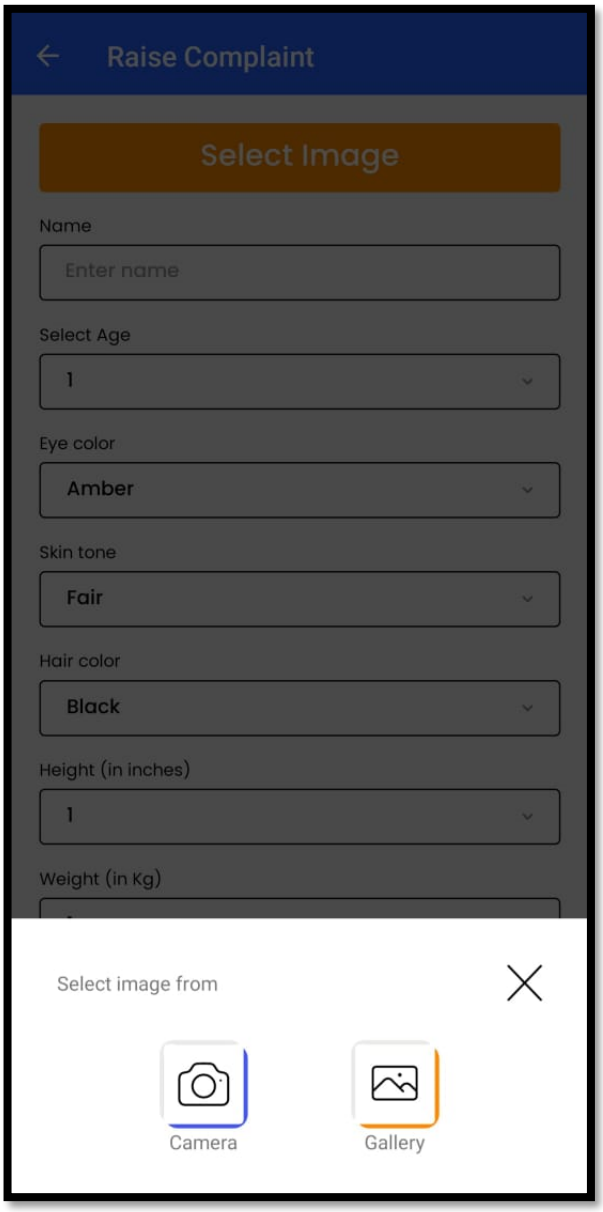

Figure 4.9: Screenshot of Image Picker Component

4.6.5 Raise Complaint Screen

This consist of option like Raise complaints Search a complaint and My complaint. At the bottom of this screen Bottom Navigation Bar was also there which is used to navigate between home screen and profile screen.

By selecting one of the above option users will redirect to the desired screen.

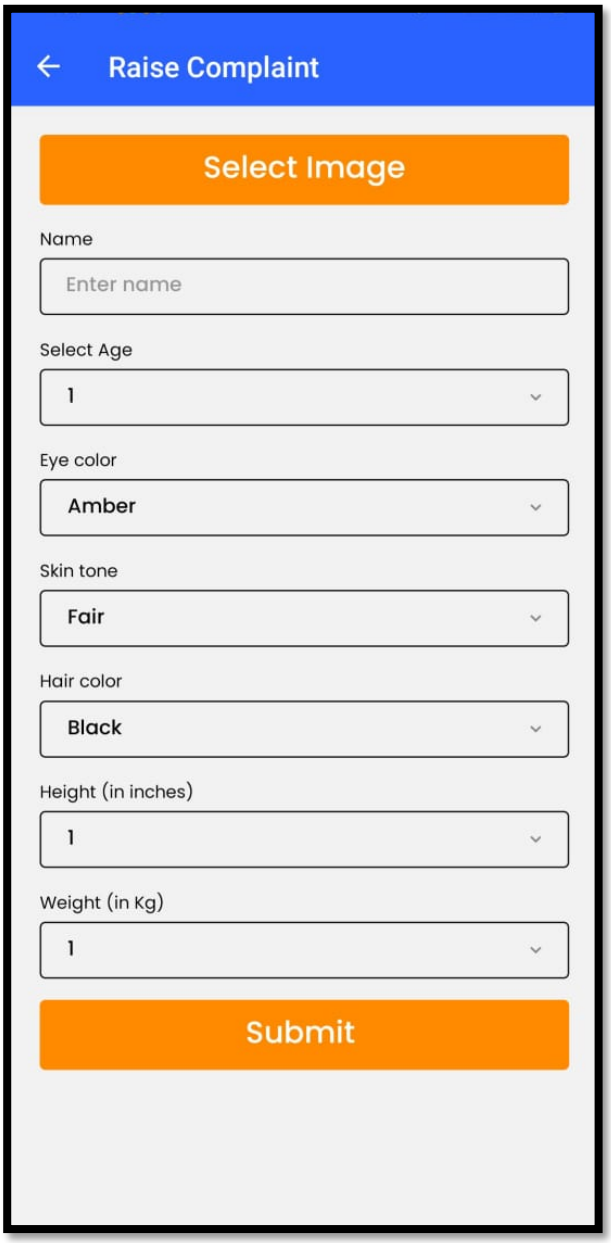

Figure 4.10: Screenshot of Raise Complaint Screen

4.6.6 Search Complaint Screen

This is a search complaint screen it consists of select image button while clicking in image picker will open and have two option to select image from gallery or camera on selecting image it will automatically call the API which first upload the selected image to the database and compare with the other images of raised complaint and if match found it will display the result in card view with match face value. It also has change image button on clicking that user can able to search with the different image. From the card result user will get some general details about the complaint and it contain a calling button on click it will redirect to dial screen with that contact number of complainers. So that user will contact.

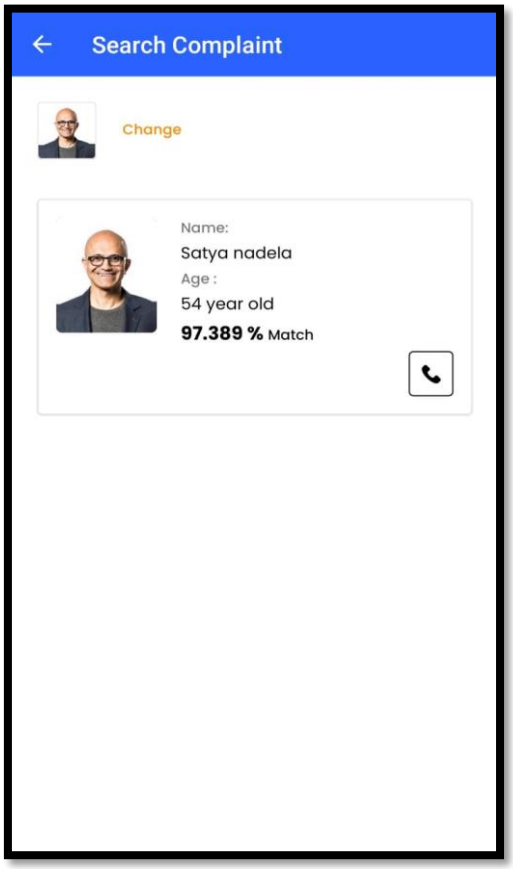

Figure 4.11: Screenshot of Search Complaint Screen

4.6.7 My Complaint Screen

This consist of option like Raise complaints, Search a complaint and My complaint. At the bottom of this screen Bottom Navigation Bar was also there which is used to navigate between home screen and profile screen.

By selecting one of the above option users will redirect to the desired screen.

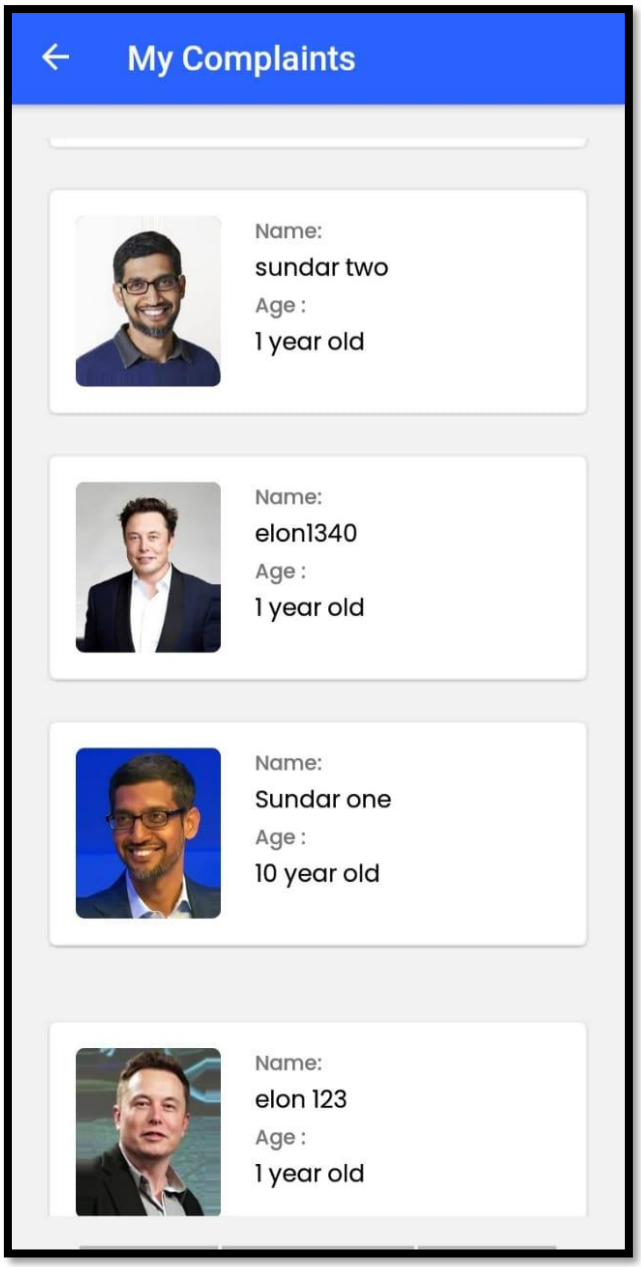

Figure 4.12: Screenshot of My Complaints Screen

4.7 Admin Panel Layout

The development of Admin Panel is done using the React JS and Visual Studio Code (IDE). React JS develop to developed modern website. This requires Node.js environment to setup the environment.

The languages used in React JS is JavaScript, html. JSX is used for both the front-end design and layout of the pages, and for the general configuration of the website.

4.7.1 Login Screen

The admin has to login the account before accessing the admin panel. The default credential for access the dashboard the is:

Email ID: admin123@gmail.com

Password: admin321

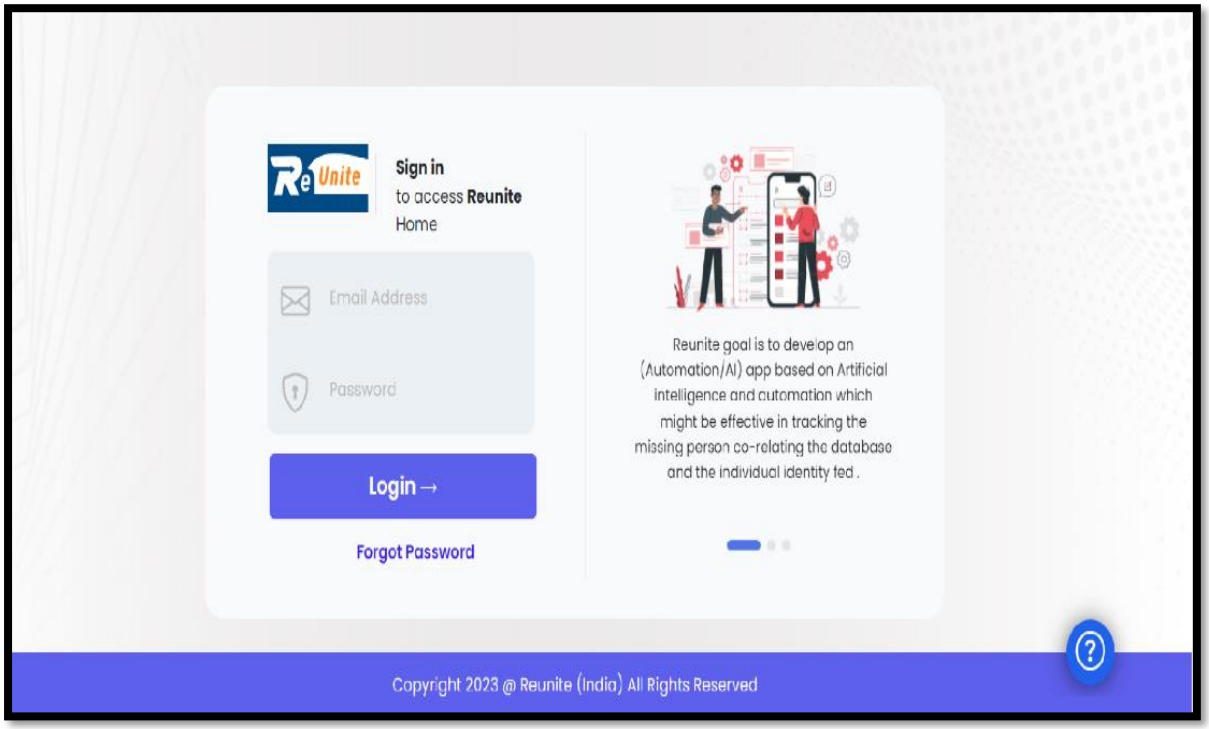

Figure 4.13: Screenshot of Login Screen

4.7.2 Users

Here admin is able to view all the users which are registered in the system thought the mobile app.

Admin can able to view all the details about the user in tabular form and also able to delete and edit the details of individual users.

Admin can able to also take action on users such as delete or edit the details. Through the page admin can also able to filter the result based on different categories and able to search the result on different parameters.

Admin can apply different filters to search the users according to its needs. Different filters includes such as age, country , key, mobile no, etc.

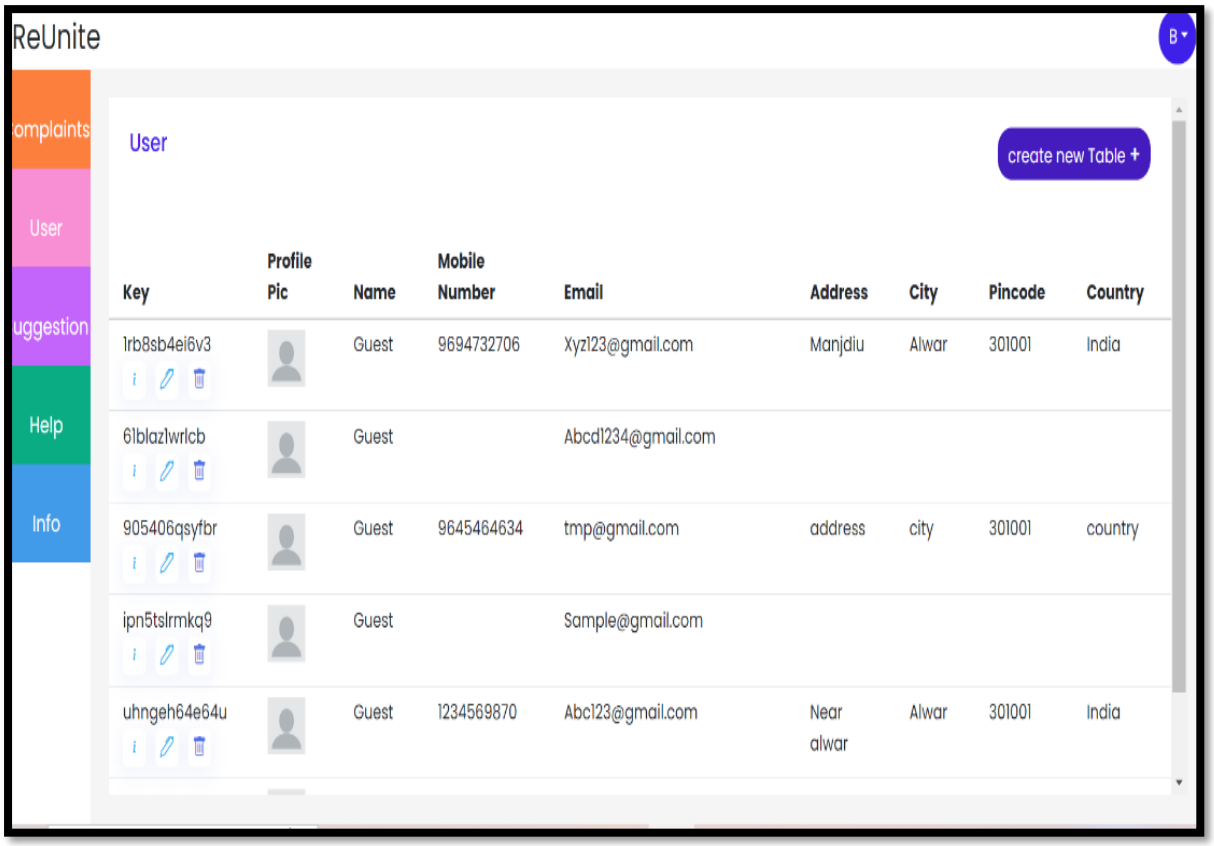

Figure 4.14: Screenshot of Users Screen

4.7.3 Complaints

Here admin is able to view all the complaints that are fetched through the API. Here admin is able to view all the users which are registered in the system thought the mobile app.

Admin can able to view all the details about the complaints and complainer in tabular form and also able to delete and edit the details of individual users. Admin can able to also take action on complaints such as delete or edit the details. Through the page admin can also able to filter the result based on different categories and able to search the result on different parameters. He can also able to filter the complaints based on the user key so only the complaint which is created by that user is visible.

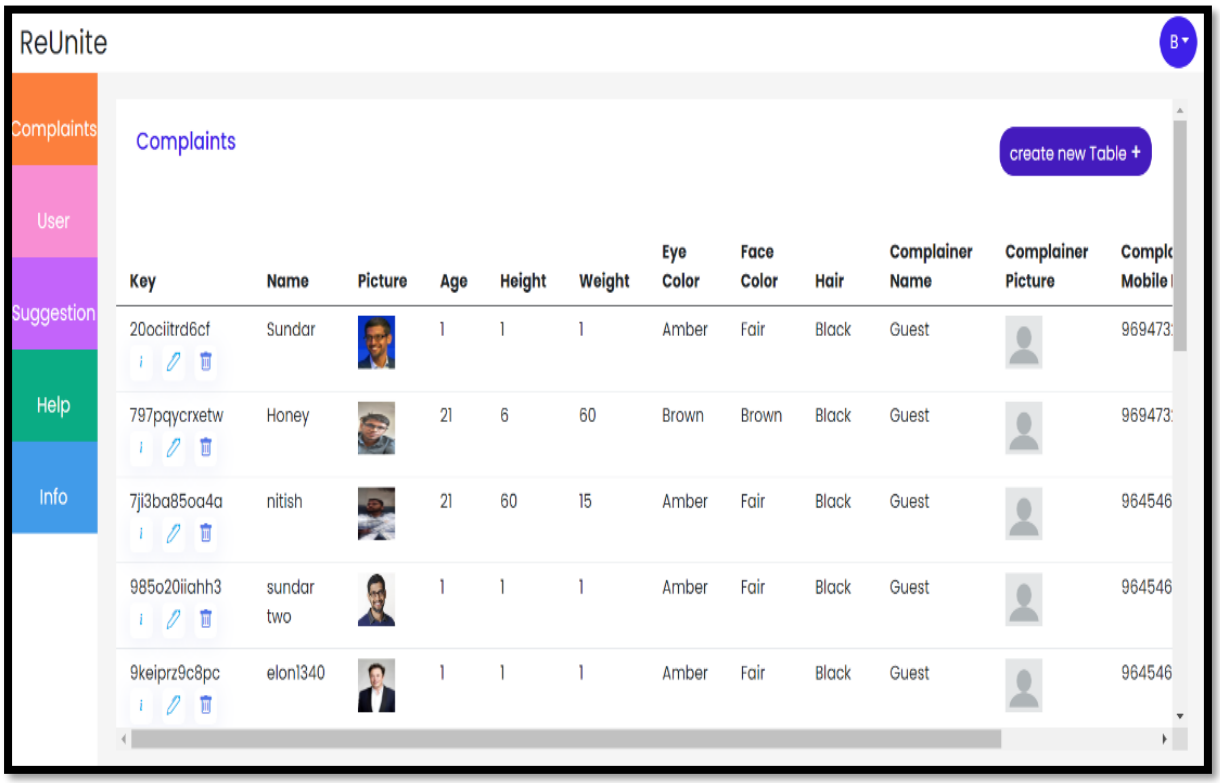

Figure 4.15: Screenshot of Complaint Screen

Chapter-5

RESULT AND DISCUSSION

In today's world, the issue of missing children and persons has become a major concern, and it requires immediate attention to be resolved. In this regard, we have developed a mobile application that allows users to register themselves and use the application's features to raise a complaint if any person is missing. The mobile application includes various features such as completing the user's profile, raising a complaint, and finding/tracking the missing child/person. Additionally, we have incorporated a face recognition API that allows users to scan a suspicious child/person's image and check if any match is found in our database. In this section, we will discuss the results of our system, including the system's performance, effectiveness, and limitations.

5.1 Results

The results of our system have been extremely positive, and we have received positive feedback from users who have used the application to raise a complaint or find a missing child/person. The system's performance has been evaluated based on several criteria, including the user interface, completeness of the user's profile, accuracy of the face recognition API, and the effectiveness of the complaint raising feature. We have presented a summary of our system's performance below.

User Interface - The user interface of the mobile application has been designed to be user-friendly and straightforward. The application's home screen provides three options for the user - complete their profile, raise a complaint, and find/track the missing child/person. The user interface has been designed in such a way that it is easy to navigate, and users can quickly

access the features they require. We have received positive feedback from users who have appreciated the simplicity and ease of use of the user interface.

Completeness of User Profile - We have made it mandatory for users to complete their profile before raising a complaint. Users need to enter their name, contact number, and address in their profile. The completeness of the user's profile is essential to ensure that the complaint raising feature is used appropriately. We have found that most users complete their profile within a few minutes of registering on the application. The completeness of the user's profile has helped in identifying the user's location quickly and accurately.

Accuracy of Face Recognition API - We have incorporated a face recognition API in our system that allows users to scan a suspicious child/person's image and check if any match is found in our database. The accuracy of the face recognition API is critical as it can significantly impact the effectiveness of our system. We have conducted several tests to evaluate the accuracy of the face recognition API, and we have found that the API performs well in identifying matches. We have also received positive feedback from users who have found the face recognition API to be useful in finding a missing child/person.

Effectiveness of Complaint Raising Feature - The effectiveness of the complaint raising feature is critical to the success of our system. Users can raise a complaint by entering the missing child/person's picture, name, age, skin colour, hair colour, and eye colour. Once a user raises a complaint, the information is saved in our database. We have found that the complaint raising feature is highly effective, and we have received several success stories from users who have been able to locate a missing child/person using this feature.

We believe that our system has several advantages over traditional methods of finding missing children/persons, including its user-friendly interface, quick response time, and the ability to use face recognition technology to identify potential matches. Our system can also help bridge the gap between citizens and law enforcement agencies and provide valuable information to aid in investigations.

One of the most significant advantages of our system is its ability to use face recognition technology to identify potential matches. This technology can help find missing children/persons quickly and efficiently, as long as there is an accurate database of individuals to compare against. Our system uses a database of registered users and missing child/person cases, making it possible to identify a match within seconds.

Another advantage of our system is its user-friendly interface, which is designed to make it easy for users to complete their profile, raise a complaint, and find/track missing children/persons. The application is straightforward to use, and all features are accessible from the main screen, making it easy for users to navigate and find the information they need.

Our system also has a quick response time, which is critical when it comes to finding missing children/persons. Once a complaint is raised, the information is saved in our database, and our system can quickly identify potential matches based on the information provided.

5.2 Discussion

The results of our system have been positive, and we have achieved our goal of providing a mobile application that can help in finding missing children/persons. However, there are several limitations to our system that

need to be addressed. We will discuss the limitations and future directions of our system below.

5.3 Limitations

The limitations of our system include the following:

Limited Data

Our system is only as effective as the data it has access to. Currently, our system relies on user-generated data, and there may be cases where users do not provide accurate information. We plan to address this limitation by incorporating additional data sources, such as social media platforms and police databases, to ensure that our system has access to a more comprehensive dataset.

Dependence on Face Recognition Technology

Our system relies heavily on face recognition technology, which can be limited by various factors such as lighting conditions, image quality, and changes in the person's appearance. We acknowledge that face recognition technology is not infallible, and there may be cases where a match is not identified even though the person is in our database. We plan to address this limitation by exploring alternative identification technologies, such as fingerprint recognition and iris recognition, to increase the accuracy and effectiveness of our system.

Limited Coverage

Our system's coverage is limited by the number of users registered on the mobile application. The effectiveness of our system relies heavily on the number of users and the coverage area. We plan to address this limitation by

expanding our user base and partnering with organizations and institutions that can help promote the use of our system.

Future Directions

We have identified several future directions for our system, including the following:

Integration with Law Enforcement Agencies

We plan to integrate our system with law enforcement agencies to ensure that missing child/person cases are handled promptly and efficiently. Our system can provide valuable information to law enforcement agencies that can assist them in locating missing children/persons.

Enhanced Data Collection and Analysis

We plan to enhance our data collection and analysis capabilities by incorporating advanced data analytics and machine learning techniques. These techniques can help us identify patterns and trends in missing child/person cases and provide insights that can be used to prevent such incidents from occurring in the future.

Expansion to Other Countries

We plan to expand our system to other countries to address the global issue of missing children/persons. Our system's success in one country can be replicated in other countries, and we believe that our system can help make a significant impact in addressing this issue.

Accuracy

The accuracy of our system is an essential factor in ensuring its effectiveness in finding missing children/persons. Our system uses face recognition

technology to identify potential matches based on the information provided by users. The accuracy of this technology can vary based on several factors, such as the quality of the images used and the size of the database.

To ensure the accuracy of our system, we have implemented several measures. First, we have developed a robust database that includes detailed information on missing children/persons and registered users. This information is carefully curated and verified to ensure its accuracy.

Second, we have implemented a face recognition algorithm that is designed to identify potential matches with a high degree of accuracy. The algorithm uses advanced machine learning techniques to analyse images and compare them to the database of registered users and missing child/person cases.

Finally, we have implemented a validation process that ensures the accuracy of the matches identified by our system. This process involves verifying the match with additional information, such as the child's identification documents, family members' contact information, or any other relevant details. This validation process helps us eliminate false positives and ensures that our system provides accurate information to users and law enforcement agencies.

In our testing, we have achieved a high level of accuracy in identifying potential matches using our system. However, we continue to monitor and improve the accuracy of our system to ensure that it remains effective in finding missing children/persons.

Chapter-6

CONCLUSION AND FUTURE WORK

6.1 Conclusion

In conclusion, our mobile application has proven to be effective in finding missing children/persons, and we have received positive feedback from users who have used our system. The system's performance has been evaluated based on several criteria, including the user interface, completeness of the user's profile, accuracy of the face recognition API, and the effectiveness of the complaint raising feature. While our system has limitations, we have identified future directions that can help address these limitations and further improve our system's effectiveness. Overall, we believe that our system can make a significant impact in addressing the issue of missing children/persons and help reunite families.

5.3 Future Work

There is still much work to be done to improve the effectiveness and efficiency of facial recognition technology in identifying missing children/person. One area for future work is the development of more robust deep learning-based algorithms that can recognize facial features even in low-quality images or when the child/person has aged significantly since the original photo was taken. Additionally, more work needs to be done to address the ethical and privacy concerns surrounding facial recognition technology, such as developing stronger data protection protocols and guidelines for its responsible use.

Furthermore, there is a need to extend the application to include other forms of biometric identification, such as fingerprinting or voice recognition, to improve the accuracy of identification. Integration with existing government

databases and cross-platform compatibility will also help in the wider adoption of this technology. Additionally, it is important to increase public awareness about the application and its benefits to encourage greater public participation in the identification of missing children/person.

Overall, the development of facial recognition technology for identifying missing children/person represents a significant step towards the protection of vulnerable individuals. Continued research and development in this area can lead to further improvements in identifying and rescuing missing children/person, ultimately contributing to their well-being and safety.

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