iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** VII **Month of publication:** July 2022

DOI: https://doi.org/10.22214/ijraset.2022.45652

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VII July 2022- Available at www.ijraset.com

Finding And Matching the Lost Victim Using AI and ML

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Abstract: ***In today's virtually and technologically evolving world, technology is being used for ease of human efforts and for faster results. Appropriate security upgrade and enhancements are required to be balanced so that the users can rely and trust their personal information on these technologies. Simultaneously, persons who goes missing if found also, there's no way to identify if it's the actual person or not. Also, many people don't try to help in these matters concerning about their life safety from goons and mafias because many missing cases occurs from kidnapping and abduction etc. So, in this paper we are proposing and fabricating a project that will help to resolve such type of incidences. The project must require the public support but will ensure the public safety by keeping the identity constraints safe and sound. This project is going to rotate the tedious and complex phases of finding the missing person by mere man-force. This technology is going to help the Police Force, the Cyber Cell Authorities as well the parents/relative/guardian of the missing victim. The User Interface will be easy to use and adaptive, the features and functionality will be top-notch as it will be designed in PyQt5 GUI. The main process is of matching the lost-found victims photograph by using the K-NN Algorithm (AI & ML concepts). All the gathered data will be kept safe in the PostgreSQL's Database for future use. The algorithm will convey through calculation of data from pictures that if the person is actually matching or not. In this way the fabricated project will execute. For further details and data, a web portal will be made for the local public about the latest and recent updates about the cases.***
Index Terms: PyQt5, GUI, K-NN Algorithm, AI, ML, PostgreSQL, Web Portal.

I. INTRODUCTION

In India every hour 48 women and 28 men approximately goes missing, which includes vast number of children also. But there are traditional existing systems that recognizes the person from their various other features i.e., birth marks, bruise / accidental marks, iris scanning etc. But rather these data have to be fed into the system prior the main processing, so as to get exact and accurate output result of the person. Also, one verifier/witness is required on spot for the verification of the person (lost/found). Besides I am going to introduce a new system in which the person can be found and verified virtually with virtual as well as physical participation. In the upcoming section, this paper will discuss about the related works.

II. LITERATURE SURVEY

A crowning ensemble-based technique for the recognition of the faces is described. In the ensemble learning a handful of methods are utilized and their outcomes are then integrated to obtain the final result of the system. In this novel system gaining the accuracy is the most important thing and the most advantageous thing. In this proposed paper **[1]**, two most vastly used techniques are (i) K-NN for the classification and (ii) Bagging as the wrapping technique, both these techniques report to ORL database for their settings **[2]**.

Various Real-Time Face Detection and Recognition techniques that has marked the facial biometrics **[3]**, facial recognition is like observing the face and capturing the image later, also this study developed the algorithms using complex background techniques like- Ada Boost, Haar/Cascade feature, Local Binary Patent (LBP), PCA algorithm and facial pre-processing also performed. But all these are proved to be very efficient and resilient **[4]**.

Docker has also proved to be a robust and efficient platform for quickly delivering the software. Docker is open source that deploys the utilization of the containers **[5]**. Docker has three parts (i)Docker Server (ii) Docker Client (iii) Docker Registry. The algorithm develops using various techniques like Deep Learning which is a sub-part of artificial intelligence. Deep Learning extracts the faces from the images **[6]**, then the images is converted to gradient and then the Support Vector Machine classifiers will make these gradient back to focal point of the picture for the training set. In this way the deep learning is used for face recognition.

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VII July 2022- Available at www.ijraset.com

Face Recognition and Detection is widely used now, of which the best technological pair is of K-NN (K- Nearest Neighbour) and PCA (Principal Component Analysis) **[7]**. Both these techniques involve approaches for capturing and identifying the image and then comparing it with the database present. There are multiple methods in which face recognition works with the system but can also compare the selected facial features matching with the database. The sequence advances like – 1) Input Image 2) Facial Detection 3) Image Processing 4) Facial- Features Extraction 5) Verification/ Validation 6) Result **[8]**.

III. PROPOSED WORK

In this proposed project, the model is based on the facial matching of the persons, by training the model with numerous types of faces to recognize the matching ones. My implementation in this paper is folded in some steps.

1) First, the data pre-processing is performed and the role of user is identified, whether its admin or public user.
2) Secondly, the database verifies the details of the either user, then if admin gets any formal complaint, then he/she will register the details of the missing person along with picture and circulate it via system server, same follows for the public also, found person's picture with location coordinates to be circulated.
3) Gathered picture from both the sides will be collected and applied with the Principal Component Analysis and K- Nearest Neighbor Algorithms to find the accuracy percentage if the missing person is same or not.
4) Found and matched cases are put up on the found cases section. Whereas, the new cases can be registered and matched with the received updates from the user's side by using the match function.
5) All these raw data as well as processed data gets stored in the database and the server for future documentation of the timestamps and data logs etc.

A. Block Diagram

The given figure 1 describes about the block diagram of the proposed system.

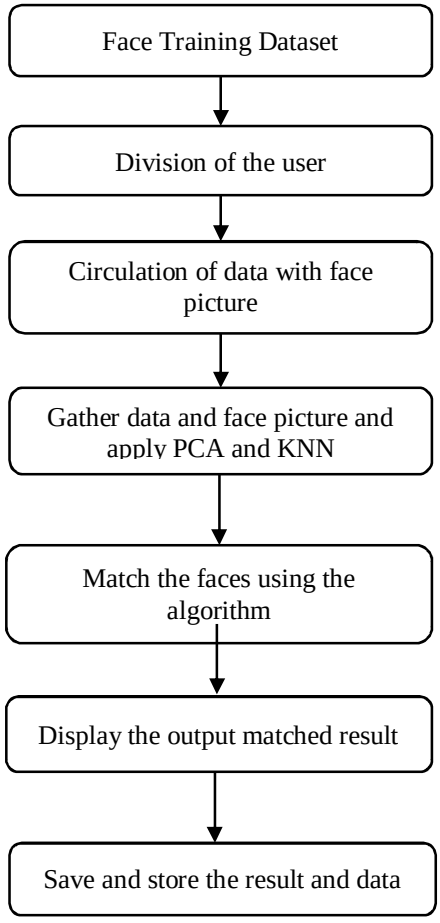


Fig. 1 – System's Block Diagram

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B. Missing Report Graph



Fig.2 – Missing Person Report Year 2014-2021

IV. IMPLEMENTATION & ANALYSIS

A. Admin's Module

1) Login Page: On every login the login page is always displayed, for the successful login; details must be entered correctly.

2) Admin's Database: Entered details in the login page is verified and authorized with the database details and then only access is provided.

3) Admin's Panel: After verification and granting access, finally the Admin's Dashboard Panel.

(a) Register New Case (b) Found Cases (c) Match Case (d) Case History

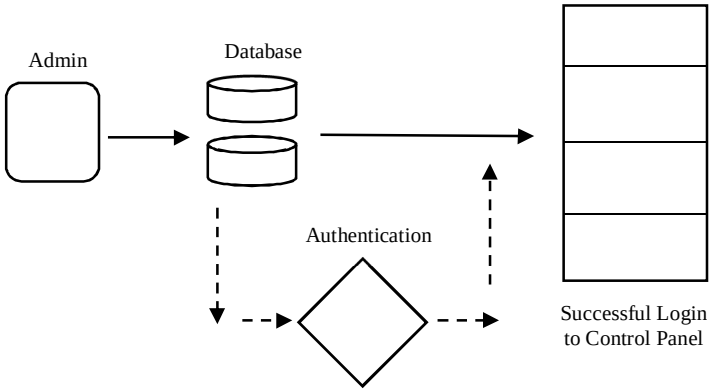


Fig. 3 – Architecture of Admin' s Module

B. Public's Module

1) Public User's Dashboard: After opening the system UI or the application, the dashboard panel of User's module will be displayed always.

2) Public Database: The details of the User and the Lost Victims is stored in the Public Database. (e.g.-name, contact details, picture of the victim, location etc.) The details stored here can be viewed by the Admin.

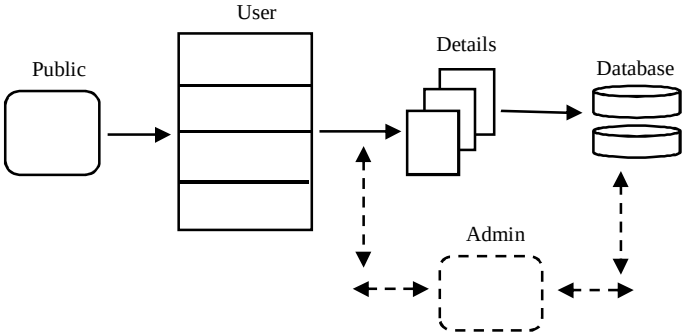


Fig.4 – Architecture of Public's Module

C. System Architecture

The architecture of the system has some important parts which comprises the whole architecture of system. The administrative module, the User module, Database, Hosting Server, IDE etc.

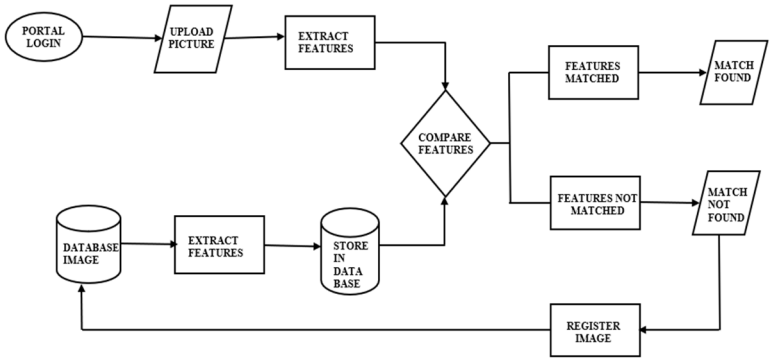


Fig.4 – Architecture of Public's Module

My proposed system comprises of layer-based implementation also. The system utilizes three layers- (i) Front-layer (ii) Middle layer (iii) End-layer.

1) *Front-Layer:* The front layer presents the user interface for the logging in of the various users, and also provide the functions to register cases, entering the details, pictures etc., which further gets stored in the database.
2) *Middle-Layer:* The middle layer acts as the mediator between the front-layer and the end layer. Middle layer takes the data from the user, processes it and stores it in the database. Middle layer kind-of follows the protocol of client-server model.
3) *End-Layer:* The end layer is wholly responsible for storing the data in the database. In my project, I have used Python, HTML/CSS, MYSQL/POSTGRESQL, Docker etc.

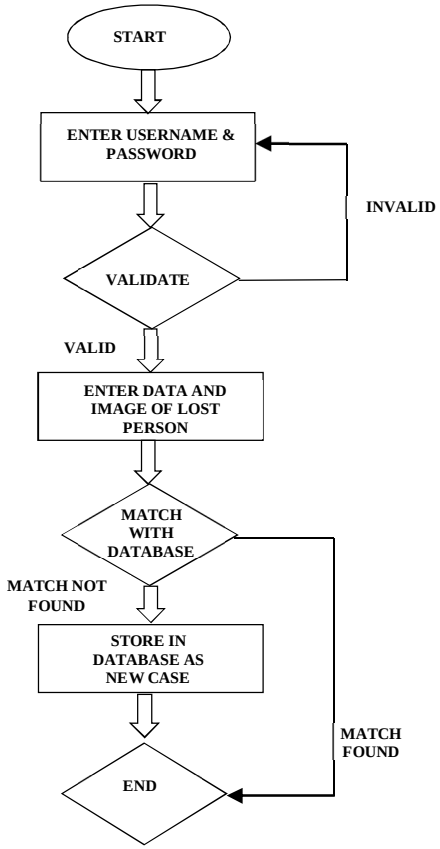


Fig.6 – Flow diagram of proposed system

V. METHODOLOGY

The system proposed by me, works on the following methodology, which is given below:

In the method applied the facial key points and values are extracted and generated from picture (face) of the lost person. The technique applied is that the library stores 68 unique facial key points for any face. These points are the floating values along with the accuracy of about 8 points after the decimal. It is shown in the figure given below.

When count of registered cases reaches to three or four, then the library generates 136 * 3 facial key points, which further defines that the 163 is the value of the x & y coordinates and they will be generated for each point, then the PCA (Principal Component Analysis) and the K-NN (K-Nearest Neighbor) classifier is trained accordingly based on these readings. Differentiated storing of facial landmark takes places by KNN classifier for different persons. In this way the facial landmarks are stored and used for matching with other person's facial landmarks to get the result is matching or not.

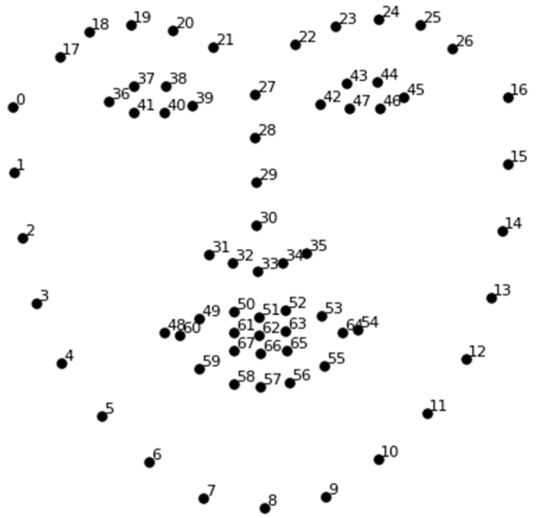


Fig.7 – Facial Landmark of extracted face key values

After gaining some previous case data and receiving any new case later, then we just need to extract the facial landmarks of the new case victim and try to match it the previous recorded data and check the confidence level of the result. If the result declares the confidence level below 60% then the person is not same, and if the confidence level exceeds 60% then the person is same.

VI. FACTS & FIGURATIVE REPRESENTATION

The Missing Person Report of NRCB of the year 2020 states about the figurative analysis of all genders and age groups.

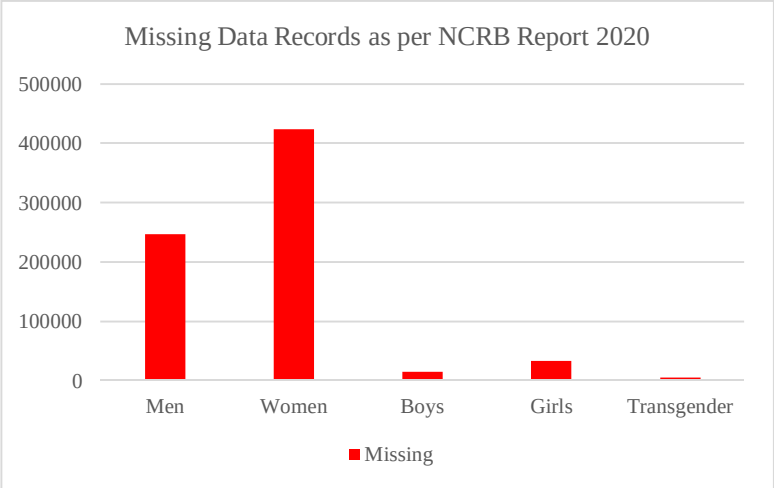


Fig.8 – Missing report of NRCB (2020)

The given below graph depicts the states of India holding the maximum recorded cases of missing person as per registration from year 2016 on basis of gender.

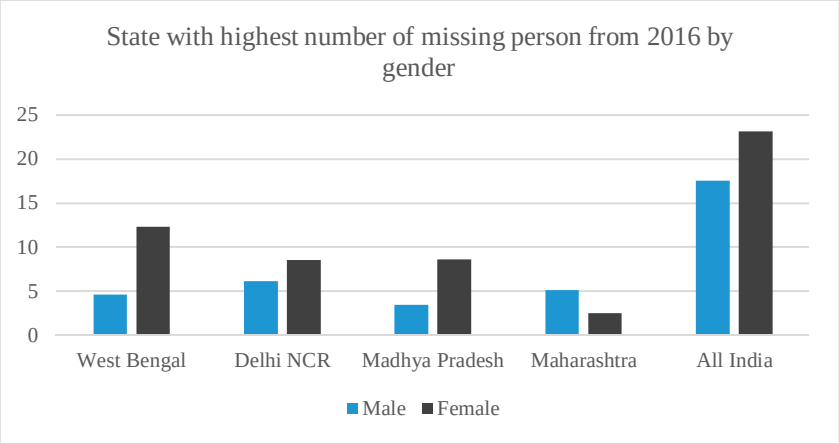


Fig.8 – States with high case of missing persons

I've built a portal for our public side users for them to get the knowledge of the persons who are missing. This portal will make our users aware about the facial identity as well as physical characteristics & details of the victim person. By this user can know whom they are finding or found.

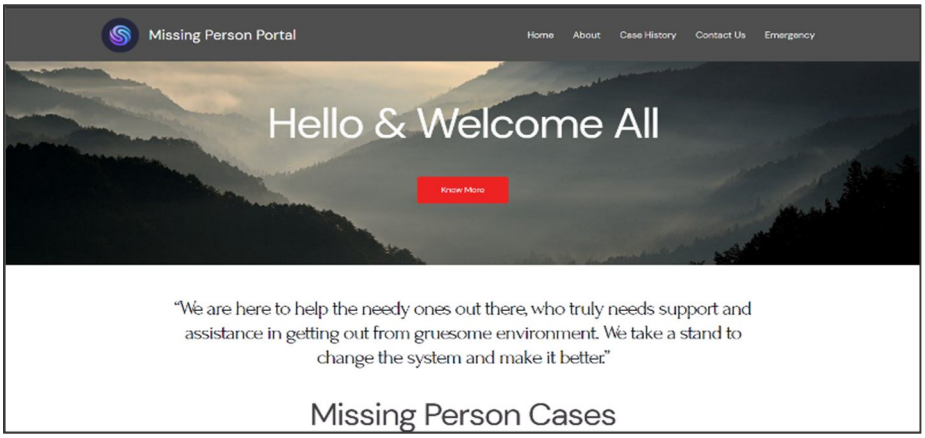


Fig.9 – Missing Person Information Portal

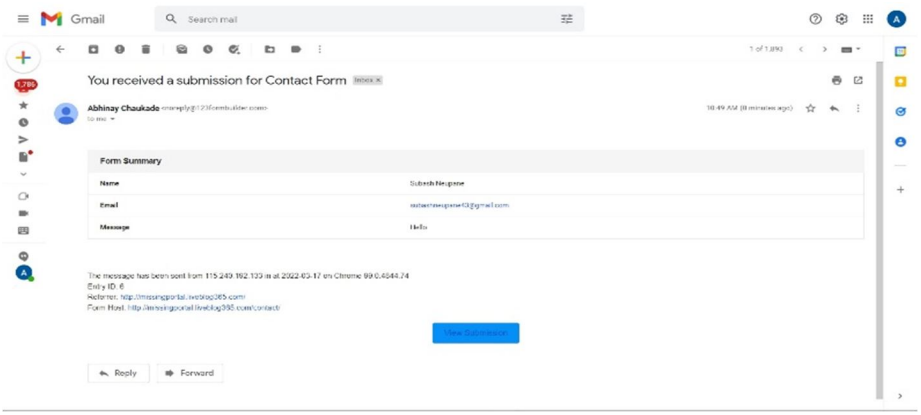


Fig.10 – Contact request from Public User

VII. OUTPUTS & RESULTS

Furthermore, I have attached the output snapshots of the project module, in given below pictures the modules like the Database, Server, Facial Matching result and Facial Landmarks can be observed.

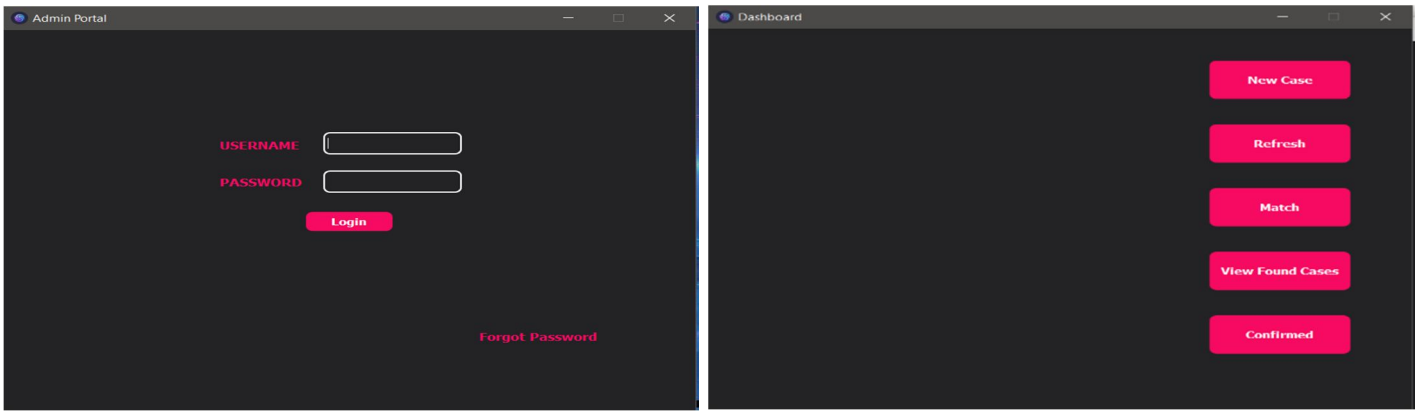


Fig.11 (a) – Admin's Portal Login & Dashboard

This is the Admin Portal's Login Page, the Username & Password are prompted for the login. After successful, the Admin's Dashboard panel will be displayed.

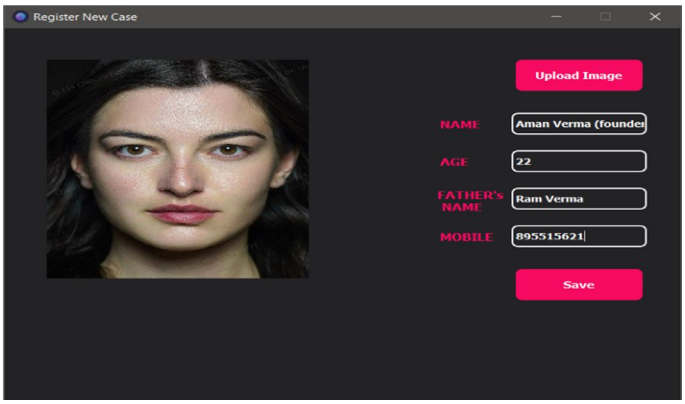


Fig.11 (B) – Admin's New Case Registration

This is the new case registration function on the Admin's Side Portal. All the victim's details are prompted for feeding & storing in the database of PostgreSQL.

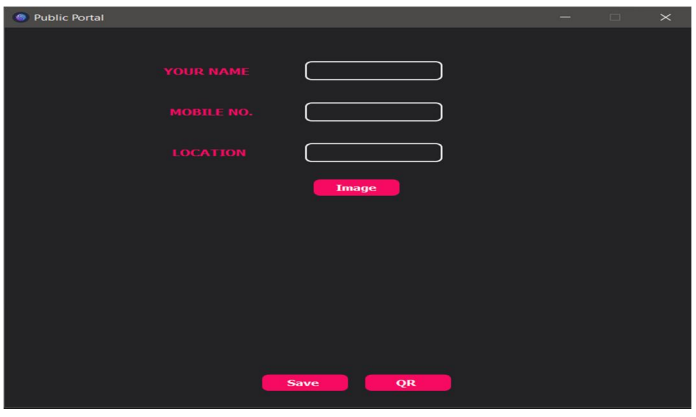


Fig.12 – Public User Portal

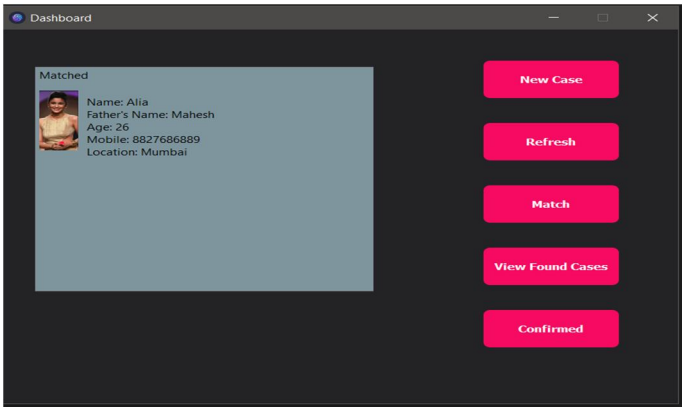


Fig.13 – The Matched Result

The Fig-12 depicts the Public Portal for the User's Side; here all the details are feeded for the found missing victim along with the image (recent found). Fig-13 displays the final resultant output of victim's found/ not found status.

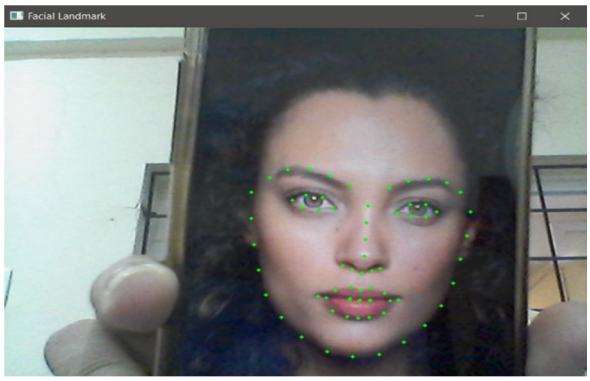


Fig.14 – 68 Facial Landmark Points

The Fig-14 depicts the 68 facial landmarks that are generated for the facial matching in the face recognition algorithm. It's a totally backend process. Based on these 68 points the face matching result is justified.

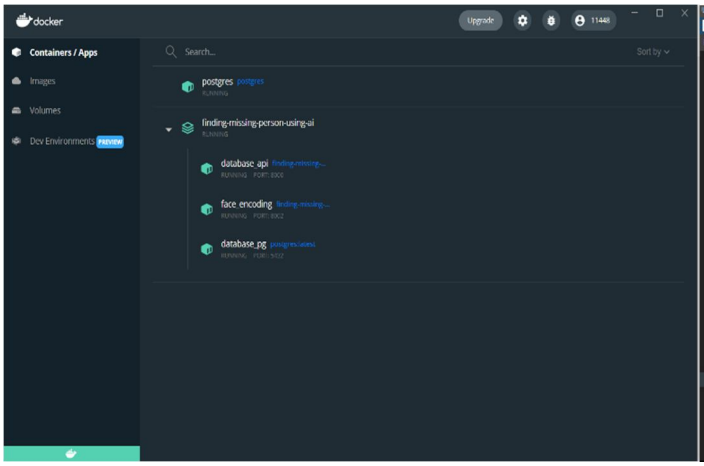


Fig.15 – Docker Desktop Image Container

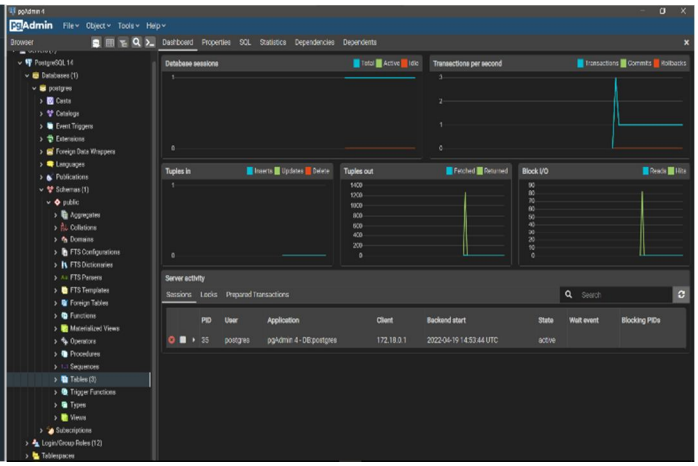


Fig.16 – PostgreSQL Dashboard Panel

Fig-15 represent the project's server for the PostgreSQL, Face Encoding and Database, all these three needs to switched on before the execution of project. The Fig-16 represents the PostgreSQL Dashboard Panel, in these all the tables can be seen where all the recorded data gets stored.

VIII. CONCLUSION

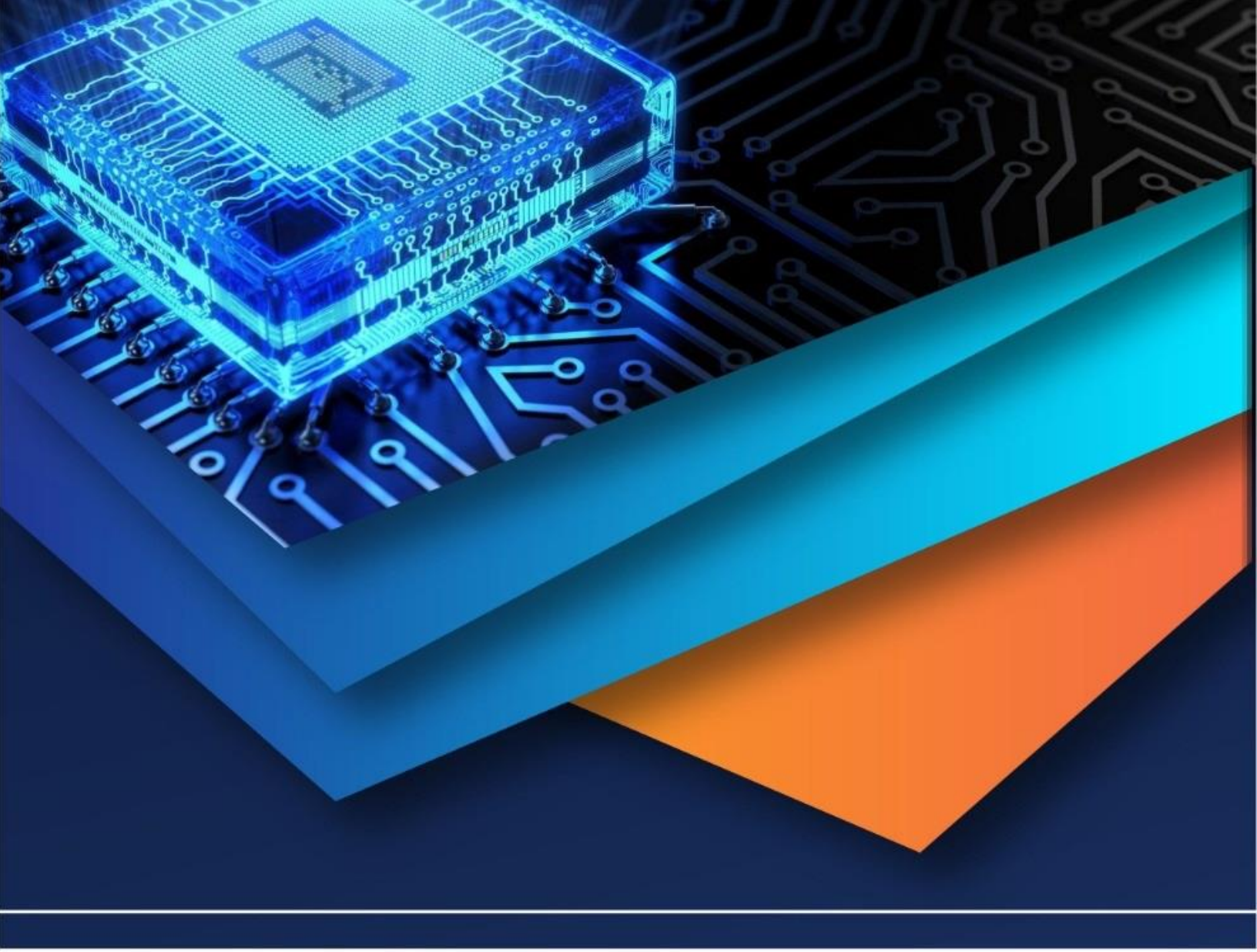
In this proposed & fabricated paper, the system turns out much efficient and all the inputs were stored exactly in the database properly (PostgreSQL Database). Also, the Missing Person Portal achieved great results in feeding information and also delivering of the form data worked out perfectly with every detail sent to the Admin's E-mail via SMTP protocol. The working of the Public User's Portal stored the data in the database very excellently and the result obtained were extremely great. The matching of the pictures was carried out with K-NN algorithm and stored accurately. All the details along with input and output were delivered and stored for future references. In future, the system can be upgraded with new technology to accomplish much more efficient results.

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