

# Face Recognition and Biometrics using AI in PDS

<sup>[1]</sup> S Aditya Gurjale, <sup>[2]</sup> Hemanth Kumar C S, <sup>[3]</sup> Mithunesh Rajan A

<sup>[1]</sup> <sup>[2]</sup> <sup>[3]</sup> Artificial Intelligence and Data Science, Sri Sairam Institute of Technology.

Corresponding Author Email: <sup>[1]</sup> sit20ad005@sairamtap.edu.in, <sup>[2]</sup> sit20ad033@sairamtap.edu.in,  
<sup>[3]</sup> sit20ad003@sairamtap.edu.in

**Abstract**— Public Distribution System is run by the government to provide subsidies to people belonging to the below poverty line (BPL) at a lesser cost. Though being a good initiative, common frauds happen in them. If people don't get their share, it'll be sold somewhere else for good profits. Most of the time, common people get cheated. Upon that, in most scenarios, people tend to receive messages stating that they've purchased so and so stuff that they haven't actually purchased. To overcome these mishaps, we bring in our proposed system of using face recognition and biometrics. This is done by replacing the existing smart card method and inserting the Face recognition software for better results.

The proposed system brings in the technical use of face recognition and biometric scanner in PDS using Artificial Intelligence and Machine Learning. The face recognition software scans the face and retrieves the data of that particular individual, and a biometric scanner is deployed to confirm the purchase.

**Index Terms**— Public Distribution System (PDS), Machine Learning, Face Recognition, Biometric.

## I. INTRODUCTION

PDS refers to Public Distribution System. It is run by the government to provide subsidies to people belonging to below the poverty line (BPL) at a lesser cost. Though being a good initiative, common frauds happen in them. If people don't get their share, it'll be sold somewhere else for good profits. Most of the time, common people get cheated. Upon that, in most scenarios, we tend to receive messages stating that you've purchased so and so stuff that you haven't actually purchased. To overcome these mishaps, we bring in our proposed system of using face recognition and biometrics through AI. This is done by replacing the existing smart card method and inserting the Face recognition software for better results.

Haar cascade frontal face is the algorithm in use here. It is an Object Detection Algorithm that is used to find faces in still photos or moving videos. The method makes use of characteristics for edge or line detection. To train, the algorithm is given a large number of positive photos with faces and a large number of negative images without any faces.

The suggested approach uses artificial intelligence and machine learning to technically utilize facial recognition and biometric scanners in PDS. A biometric scanner is used to verify the purchase after the facial recognition software scans the user's face and retrieves their specific data.

## II. OBJECTIVE

1. To replace smart cards by FACE RECOGNITION
2. To detect anomalies in:
  - Product Fraud
  - Money Laundering
3. To avoid fake messages

4. To confirm purchased products using biometrics
- 5.

## III. PROPOSED SOLUTION

- PDS card maintenance is a tough job i.e. if it gets lost, the after-process is time-consuming. Upon that, even if we forget our card at home, we have our face to register our stuff.
- If we in case lose our smart card, a face recognition system will be the best substitute.
- In PDS shops, even if we don't buy a desired stuff/product, we still get a message stating that we had purchased the product, but in reality, we hadn't.
- In order to finalize the products, we had originally bought, we make use of biometrics.
- The products and the info that we buy will be entered into the database only after scanning the finger. So, the power of control remains only with the respective people and not in the hands of government officials.

## IV. LITERATURE SURVEY

### 1. Huda mady, Shadi M.S. Hiles & 2018

#### Face recognition detection using Random Forest 2018 International Conference on smart Computing

The effective facial recognition method should perform well in unregulated environments based on video broadcasts to satisfy the demands of applications in real-world.

### 2. Onur Can Kurban, Tulay Yildirim & 2017

#### A multi-biometric recognition system based on deep features of face and gesture energy image 2017 IEEE International Conference on Innovations

In face recognition systems, variables such as the direction

of light, facial expression and reflection make identification difficult. With biometric fusion, both safe and high-performance results can be achieved.

**3. Chaitali Chandankede, Debajyothi Mukhopadhyay A proposed architecture for automating the public distribution system**

**2017 International Conference on Computing and Automation**

The project proposes the improvised technique of implementing a smart ration card system. It also depicts the automated version of the Public distribution system.

**4. Lixiang Li, Xiaohui Mu, Siying Li, HaipengPeng A Review of Face Recognition Technology**

**2016 International Conference on Computing and Automation**

Face recognition technology is a biometric technology, which is based on the identification of the facial features of a person. People collect the face images, and the recognition equipment automatically processes the images. The paper introduces the related researches of face recognition from different perspectives. The paper describes the development stages and the related technologies of face recognition.

**5. Praveen KumarSingh, Neeraj Kumar, Bineet Kumar Gupta**

**Smart Cards with Biometric Influences: An Enhanced ID Authentication**

**2019 International Conference on Cutting-edge Technologies in Engineering (Icon-CuTE).**

Management of flow of all kinds of objects including human beings signifies their realtime monitoring.

This paper outlines the advantages accrued out of biometrics integration with Smartcards. It showcases the identity authentication employed through different biometric techniques.

Biometric key considerations influencing the essence of this technology in Smartcards have been discussed briefly in this paper. With better accuracy and a highly reliable support system, this technology finds itself today in widespread deployment.

**6. Hanaa Mohsin Ahmed, Rana Talib Rasheed**

**A Raspberry Pi Real-Time Identification System on face recognition**

**2020 Information Technology to Enhance e-learning and Other Application (IT- ELA)**

Face recognition can be considered as a significant section for the aim of securing and monitoring, specifically for disabled people via utilizing the algorithm of real-time face recognition. A Raspberry Pi-based face recognition system using traditional mechanisms of face detection and recognition will be provided so the way that image-based biometrics utilizes a Raspberry Pi is depicted. This paper's

goal is to move face recognition toward a level where the system can substitute the use of a password and RFI- Cards for accessing security systems.

## V. REQUIREMENT SPECIFICATION

### 1. Jupyter Notebook

An interactive computing environment for creating notebook papers is available online under the name Jupyter Notebook. A Jupyter Notebook document is a browser-based REPL that has an ordered list of input/output cells with code, text (using Markdown), math, graphs, and rich media as possible contents. A notebook is a JSON document that follows a versioned structure and typically ends in ".ipynb" underneath the interface.

### 2. OpenCV

A machine learning and computer vision software library is called OpenCV. Along with well-known companies like Google, Yahoo, Microsoft, Intel, IBM, Sony, Honda, and Toyota that use the library, there are many start-ups like Applied Minds, VideoSurf, and Zeitera that heavily rely on OpenCV. It was created to provide a common infrastructure for computer vision applications and to speed up the use of machine perception in commercial products.

### 3. Haarcascade Frontal Face

It is an Object Detection Algorithm that is used to find faces in still photos or moving videos. The technique makes advantage of Viola and Jones's

suggested edge or line detecting features. To train, the algorithm is given a large number of positive photos with faces and a large number of negative images without any faces. Digital image properties that resemble Haars are employed for object recognition. They were employed in the first real-time face detector and got their name from how intuitively they resembled Haar wavelets.

A Haar-like feature's primary advantage over most other features is its calculation speed. A Haar-like feature of any size can be determined in constant time by using integral pictures.

### 4. Python

Python is a dynamically semantic, interpreter-based, object-oriented, high-level programming language. It is particularly appealing for Rapid Application Development as well as for usage as a scripting or glue language to connect existing components due to its high-level built-in data structures, dynamic typing, and dynamic binding.

### 5. Raspberry Pi

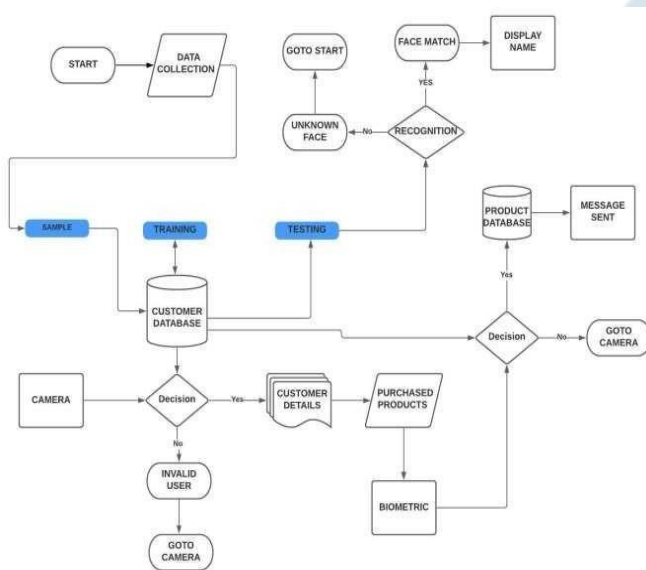
The Raspberry Pi is a credit-card-sized computer that plugs into a computer monitor or TV and operates with a standard keyboard and mouse. It's a capable little device that allows people of all ages to learn about computing and programming languages like Scratch and Python. It can do

everything a desktop computer can, from browsing the internet and watching the high-definition video to creating spreadsheets, word processing, and gaming.

**6. Biometric Scanner**

A fingerprint scanner is a piece of technology that recognizes and authenticates an individual's fingerprints in order to grant or deny access to a computer system or physical facility. It is a type of biometric security technology that uses a combination of hardware and software techniques to identify an individual's fingerprint scans. Typically, a fingerprint scanner works by first recording fingerprint scans of all authorized individuals for a specific system or facility. These scans are archived in a database. The user who needs access places their finger on a hardware scanner, which scans and copies the individual's input and looks for any similarities among previously stored scans. If a positive match is found, the individual is granted access. Fingerprint scanners typically use a person's thumbprint to identify them.

**VI. DATA FLOW DIAGRAM AND MODULES**



**VII. MODULES**

1. Module 1: Exploring UI
2. Module 2: Data Generation, Designing of Classification Model
3. Module 3: Storage
4. Module 4: Real-Time Recognition
5. Module 5: Database and Confirmation message

**7.1 EXPLORING UI**

For the Data Collection process, we've created an application in which we collect the consumer's details namely Aadhaar No, Name, Gender, and DOB to name a few. We collect the face of consumers as data for training the model. We test the model with a real-time face for recognition.

**7.2 DATA GENERATION, DESIGNING OF CLASSIFICATION MODEL**

Module 2 talks about the functions of 'Sample Collection', 'Training', and 'Testing'.

- In the 'Sample Collection' process, we are using cv2 to capture the face of the user. The images are captured in greyscale. The model detects faces and stores the detected faces in a cropped form. The images of each individual are stored in a folder. It is stored as [user no. image no.], for example [1.1 .... 1.10], [2.1 .... 2.10] ... If we press the enter key, the capturing of images will stop abruptly without completing its 10-picture mark. If we get 10 pics of a person, the execution will automatically stop.
- In the 'Training' process, we train the model using 'Haarcascade Frontal Face' algorithm. We measure the width and length of the detected faces using this algorithm.
- In the 'Testing' phase, the camera detects and recognizes faces using trained pictures.

**7.3 STORAGE**

In this module, a mini cloud database will be built in which data is stored that was collected earlier through the data collection applications (modules 1 and 2). This proposed cloud database system will be used to fetch the details of the user.

**7.4 REAL TIME RECOGNITION**

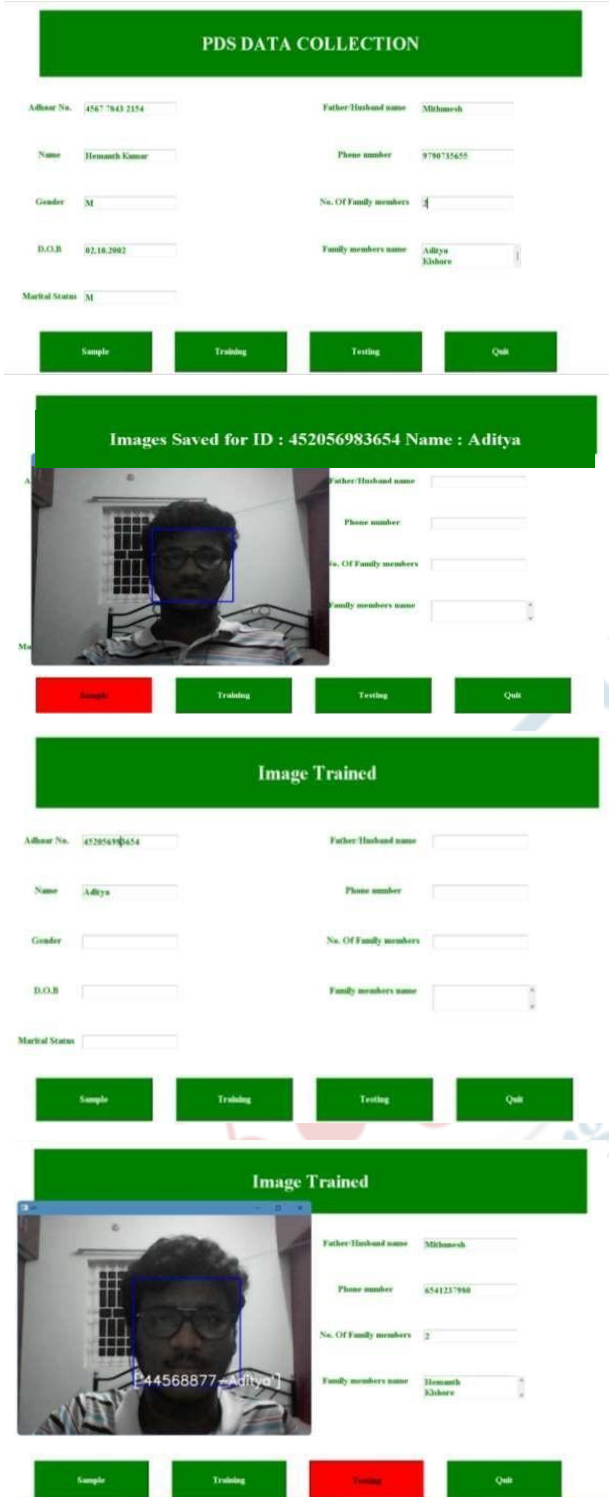
In this module, the model detects and recognizes the real time face and checks with the cloud containing the user details. If the faces match, it displays the user details stored in the cloud application.

**7.5 : DATABASE AND CONFIRMATION MESSAGE**

In this module, the products bought by the buyer are stored in the database after a biometric scan. This ensures that the power remains in the hands of the people and not with the officials. The list of products bought by the customer cannot be altered by the officials. After this, a confirmation message is sent to the buyer's number to confirm the purchase of the products.

The message is sent from the client side to the server side. The users are the clients and the government is the server. After every successful purchase of products, a message is generated and sent to the user's mobile. The mobile number of the user is given as input.

**VIII. RESULTS**



face. This innovation is being implemented because people may forget their PDS cards or may have lost or broken or there might also be chances of owning illegal PDS cards. The main purpose of this innovation is to avoid the problems currently occurring in PDS which include product and money launderings. The products that were bought by the customers are stored in the cloud database. Biometrics is used to confirm the purchase of the products. AI is making a drastic change in each and every sector. Positive usage of the boon is a must.

**REFERENCES**

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- [5] [https://biometrics.mainguet.org/types/fingerprint/fingerprint\\_algo.htm](https://biometrics.mainguet.org/types/fingerprint/fingerprint_algo.htm)

**IX. CONCLUSION**

AI can be used to achieve enormous heights. Some of the examples include like the use in PDS, etc. Using AI, the existing smart card system is being replaced by Face recognition. People can purchase commodities with their