

# Fault Prediction System With Face And Biometric Using Convolutional Neural Networks

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**Abstract:** *In our everyday lives, everybody is utilizing vehicles. In request to begin the vehicle, the vehicle key is the best way to begin the vehicle or to give start to the engine. The Multi model based vehicle starter framework actually replaces the vehicle start by supplanting the key with explicit client face. This savvy vehicle framework is controlled by a Raspberry pi circuit. Here we utilize a two way verification framework for making sure about the vehicles. The techniques utilized here are Face acknowledgment and Biometric Method. It contains LCD show, engine, signal, camera and a Fingerprint scanner. Here, the Multiple validation framework takes numerous photographs of the individual and stores this information into the database and simultaneously it takes a lot of fingerprints and stores them in the database. When the driver goes into the vehicle, his face will be examined by the camera and it should coordinate with the unique mark that is put away in the database. On the off chance that both face and unique mark is coordinated, at that point the vehicle starts. If an unapproved client attempts to gain admittance to the vehicle, the get to gets denied, so that the engine doesn't turn over and empower signaling sound. Hence, it encourages us to make sure about such wise vehicles in a more intelligent manner.*

**Keywords:** *Camera, Fingerprint device, Raspberry pi, LCD Display, LBPH Algorithm, Minutiae Algorithm.*

## 1. INTRODUCTION

In this world, everyone and every industry likes to keep in pace with the movement in the innovation [1]. Nowadays nearly everyone has a vehicle. As purchasing a vehicle is a huge investment, humans are unquestionably associated with encountering the prevalent innovations particularly in vehicle undertaking [2]. In this way, vehicle bunches have seen a top notch raise of their mechanical factors by presenting computerization with inside the vehicles to offer purchaser benevolent and create capacities to their customers [3]. The motivation behind this investigation is to upgrade the face recognition and biometric exactness in vehicle cabin. In this two distinct calculations are utilized for Face and Fingerprint acknowledgment [4]. LBPH Algorithm is used for face distinguishing proof and Minutiae Algorithm is used for one of a kind imprint recognition. In this the Face disclosure could be a sort of thing class revelation

inside which the zones and sizes of all articles in a picture that have a spot with a given order are found. Biometrics is that the science and development of assessing and separating regular information[5]. In data technology, biometrics insinuates developments that live and analyze human body characteristics, as fingerprints, eye retinas and irises, voice structures, facial models and hand estimations, for check.

## 2. LITERATURE SURVEY

**Haruo Matsuo et al.**, describes the Automobile Driver Face Recognition in Numerous Sunbeams Atmospheres using Self-possessed Face Images. The persistence of this learning is to extend the face recognition accurateness in automobile cabin through prevailing face indicators used in client submissions. We tend to extend the volume of drivers expressions in coaching dataset by producing the shaded drivers faces after numerous directions of daylight which square measure formed victimisation of an image constituting method.

**Sai Deepika Regani et al.**, represents about the Motorist Validation intended for Shrewd Car Using Wireless Sensing[9]. The proposed system will acknowledge human identity by using distinctive radio biometric info documented within the network state-run info (CSI) through multipath dissemination. It will collect a drawn out driver radio biometric data including radio insights of seven individuals accumulated over a period of 2 months[10]. It will affect this database to make AI (ML) models that make the proposed structure versatile to new in-vehicle conditions.

**K.S. Tamilselvan et al.**, represents about the Structure also, Implementation of Biometric Based Smart Antitheft Bike Protection System. In this a lot of analysis are occurring within the sector of bioscience[6]. The planned thought within the paper focuses on the implementation of biometric bikes particularly, engine bicycles and bikes[7]. This paper gives a decent goal in order to make guarantee a huge amount of security and keep away from unapproved utilization of motorbikes. This simple and compelling equipment has been planned, upheld and tried with motorbikes[8]. It will examine results to show that the made system chooses the most ideal individual and grants the correct individual to start the bike.

**S. Padmapriya et al.**, represents the Real Time automobile car Lock Security System exploitation Face Detection and Recognition. In this paper the face ID is applied to persistent vehicle taking area application. The face identification configuration is proposed to be abuse appearance data with Adaboost algorithm principle. Skin shading recognition is performed on the info shading picture to decrease the technique quality. Formerly, by abuse head part analysis (PCA) calculation, a particular face could likewise be perceived by looking at the rule components of this face to those prominent individuals during a facial database which will inbuilt development.

**Ajish T et al.**, describes the Raspberry Pi principally based Intelligent car Anti-Theft System Through Face Recognition misuse GSM and GPS[11]. In this paper the system definitely takes photos of the driver and complexes their face and information to imagine whether he is a related driver or not. The face area structure relies upon cutting edge PCA administers and may discover faces in vehicles[12]. Various modules impart imperative information to customers and encourage staying eyes on vehicles never-endingly, regardless, when the vehicle is lost. This framework model relies upon Raspberry pi which controls all the strategies.

**Ishita Gupta et al.**, represents about the Face Detection and Recognition using Raspberry Pi. The objective of this paper is taking face popularity to a stage where the machine can update using passwords and RFID-Cards to get right of entry to excessive protection structure and buildings. Face acknowledgment is a significant part with the end goal of security and observation. Our goal is to explore the implementation of Raspberry Pi based face recognition system and recognition techniques like Haar detection and PCA. It makes the system price effective and simple to use with high performance.

**N.N.Nagamma et al.**, describe the Raspberry Pi based for the most part distinguishing proof Vehicle Door lockup System. The central purpose of this paper is to shield the vehicle from unapproved people by using the uncommon id that is one of a kind finger impression verification. At the spot of the door locking structure, the finger impression scanner is set to jolt and open the gateways rather than the standard portal lockup system Which gives a lot of confirmation to the vehicle owner. The other sign structure is additionally developed by using GSM modules to send the message to the vehicle owner adaptable. The whole system is obliged by the Raspberry pi 3 processor.

**Mahesh R. Pawar et al.**, describe the IoT Based Embedded System for Vehicle Security And Driver Surveillance. This paper proposes arranging and improvement of threatening to theft, other than as a driver observation introduced structure that uses ID to get to the vehicle. This system contains a camera which snaps the photo of an individual endeavoring to request access to auto and differentiate and endorses a person's image by then allowing or blocking access. On account of refusal of engine vehicle get to or regardless of whether a partner degree mishap occurs, the camera can catch the pictures and email it to the proprietor or authoriser. This may help with getting hoodlums, also allows the surveillance of drivers and besides the inward bit of the vehicle. The framework is sorted out and made utilizing raspberrypi.

**A.Fathima Jabeen et al.**, represents the Headway and uses Raspberry Pi based Ignition control framework. This paper proposes a beginning for consistent revelation of driver's face affirmation, special imprint approval moreover as alcohol intoxication and as needs be forewarning them. The guideline purpose of this arranged structure is proportional to the amount of incidents in view of driver's lethargy and spirits utilization to expand the transport protection further as shield the cars from taking. This anticipated plan contains 8-megapixels progressed USB camera, Raspberry-pi stacked. Face revelation is that a huge bit of this endeavor will be done using OpenCV.

**Harshal V. Khodaskar et al.**, represents a Human Face Detection and Recognition Using Raspberry Pi. In this paper we suggest a face disclosure and affirmation system that will have the option to do taking care of pictures rapidly while acquiring astoundingly start to finish veritable idealistic face revelation extent. The framework is tried across deferred ordinary face databases with and keeping in mind that not clamor and obscuring impacts. Profitability of the structure is separated by finding out the Face distinguishing proof rate for every database. The results reveal that the proposed structure is habitually used for face disclosure even from bad quality pictures and shows extraordinary execution adequacy.

### 3. PROPOSEDSYSTEM

The block diagram for the access of biometric systems using raspberry pi facial recognition system and finger recognition system is shown in figure below.

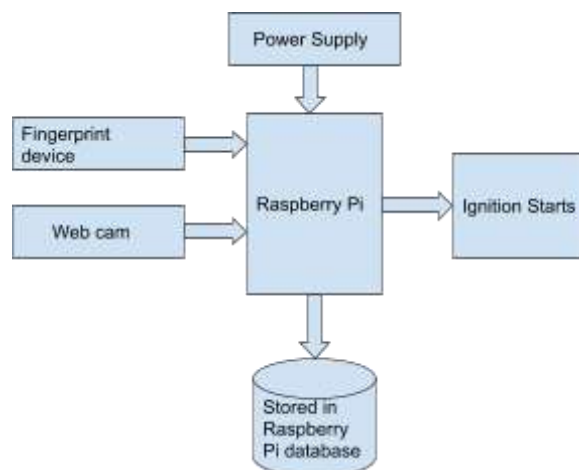


Fig.1. BLOCKDIAGRAM FOR PROPOSED SYSTEM

In this proposed system, I have connected a Raspberry pi sensor to 2 devices namely fingerprint device and web camera. It has been associated with a database which stores all the data about the finger impression and face acknowledgment features. The whole system consists of the subsequent parts: a picture catching camera, Raspberry Pi board to run picture acknowledgment programs. Screens are additionally associated with this framework during introductory stages to review the caught pictures and give the client indication. The working consists of two phases,

i.e. enrolment phase and verification phases. The reason for the enrolment model is to enlist all the position clients to get control and spare the biometrics highlights in a database. The check (or verification) model utilized confirms the asserted personality of an individual.

#### *FINGERPRINT RECOGNITION USING MINIATURE ALGORITHM*

A unique mark is an effect on the epidermal edges of a person's tip. A progressive system of 3 degrees of options. Fingerprint detection methods is of 2 sorts – disconnected filtering and live-examining. In disconnected detecting fingerprints are gotten on paper by "ink procedure" which are then checked utilizing paper scanners to flexibly the computerized image. Most AFISs use live-inspecting where the prints are directly gained using an electronic one of a kind imprint scanner. For all intents and purposes all the current sensors have a spot with one of the three families: optical, solid state, and ultrasound.

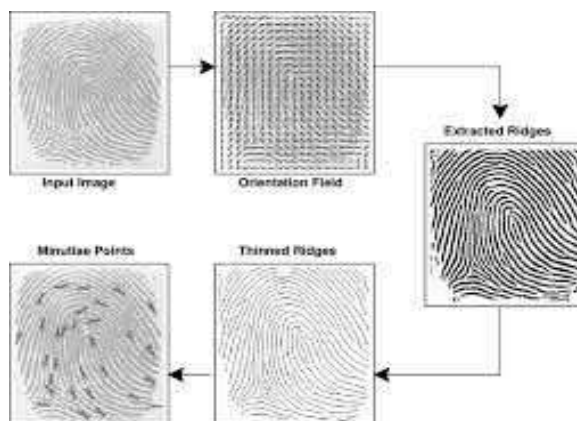


Fig.2. MINUTIAE EXTRACTION

Binarization is the procedure by which an upgraded dim level picture is changed into a double picture for ensuring component recognition. Smart binarization algorithms ought to minimize info loss and additionally give economical machine quality.

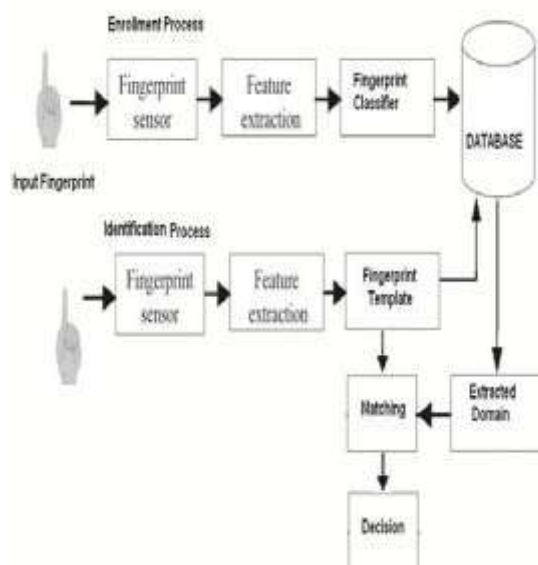


Fig.3. BLOCK DIAGRAM FOR FINGERPRINT

### Recognition

After beginning unique mark include extraction some post-preparing is required for emptying bogus or misleading details identified in amazingly undermined areas or presented by past procedure steps (e.g., diminishing). Another strategy for expelling all the misleading pixels produced at the diminishing stage so as to encourage minutiae filtering. Average unique finger impression acknowledgment techniques utilize includes coordinating, where details (i.e., edge consummation and edge bifurcation) are extricated from the enrolled finger impression picture and the information unique finger impression picture, and the quantity of Binarization Ridge Thinning corresponding pairings with 2 pictures is employed to acknowledge a valid fingerprint image. The details coordinating issue has been commonly tended to as a point

design coordinatngissue.

*Facial Recognition Using Lbph Algorithm*

The inputs are often recorded as video employing a web camera. From this video, the face is detected and saved. A preprocessing module marks the attention position and conjointly takes care of the encompassing lighting condition and color variance. once the face is detected, localization and social control are administered. The presence of the face can change impressively during discourse and because of outward appearances. In this work, we have a tendency to introduce a brand new approach for face recognition that considers each form and texture info to represent the face pictures. As opposed to the EBGM approach, a clear extraction of the face highlight vector (histogram) is received – in our calculation. The face picture is first separated into small areas from which the Local Binary Pattern (LBP) highlights [8,9] are extracted and connected into a solitary component histogram effectively representing the face picture.

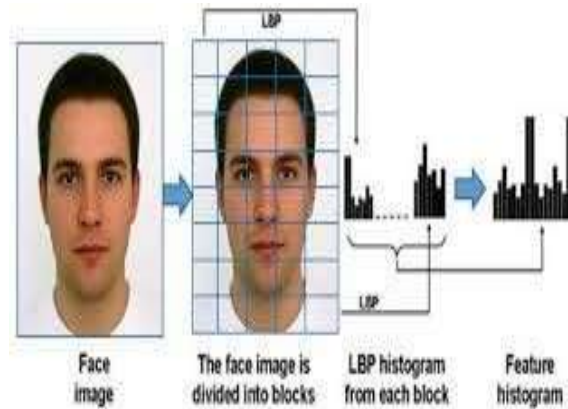
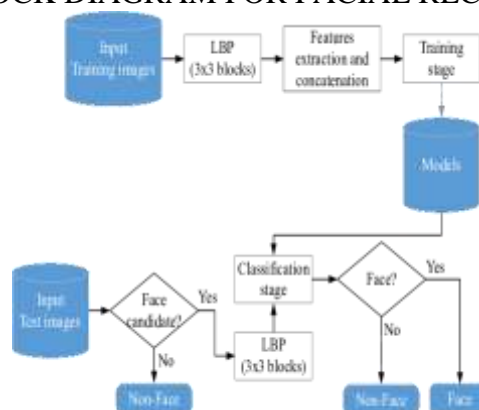


Fig.4. FACE RECOGNITION USING LBPH ALGORITHM

The point of LBPH is to figure by squares of 3x3 pixels. The thresholded square and loads square are missing in the picture, they are only a depiction to fathom the technique. When all the correlations are finished, each outcome is expanded by a weight. Each pixel has a heap to the force of two from 2x to 2y. Every pixel in the point of convergence of a 3x3 square contains 8 neighbors. These eight pixels speak to one PC memory unit that clarifies the clarification of abuse of these loads.

Fig.5. BLOCK DIAGRAM FOR FACIAL RECOGNITION



LBPH has been altered in a few different ways (what-when-how). One of them is called Extended LBPH Depending on the range (figure 7), the pixel in the inside could be contrasted with certain pixels which are not close to it. Another extension is named uniform pattern (what-when-how). This modification makes the vector representing the histograms smaller.

LBPH consistently had at least 96% inside the principal stage and was the second-best calculation. In the resulting stage, this count had a following drop in its precision that stood out from the fundamental stage. It was to some degree less exact than Eigenfaces. an ascent inside the quantity of subjects drastically changed its expectation. In each area, an ascent inside the training information

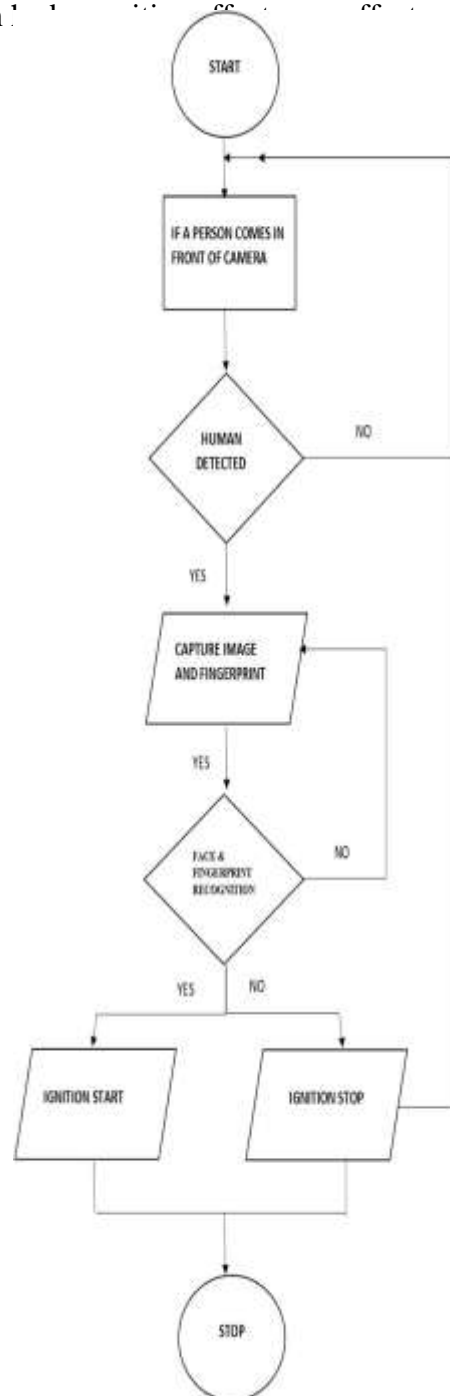


Fig.6.FLOWCHART FOR PROPOSED SYSTEM

#### 4. WORKING MECHANISM

This circuit outline for the most part involved Raspberry Pi B+, Raspberry Pi camera, Fingerprint gadget, a pushbutton switch, an exchange and some arbitrary components. In this Raspberry Pi and unique finger impression sensor are appended to the Raspberry Pi board. Fingerprint gadget is associated alongside camera module. Face pictures are gotten through Raspberry Pi camera and set aside in a database in Raspberry Pi. To catch your face picture, place yourself before the Pi camera and press pushbutton switch S1. The picture of your face will get put away inside the database. Each and each time when unique mark is identified it ought to be coordinated with face. Next time when you face Pi camera and press S1, your face will be seen, move RL1 will be engaged and your electrical weight/solenoid will be started.

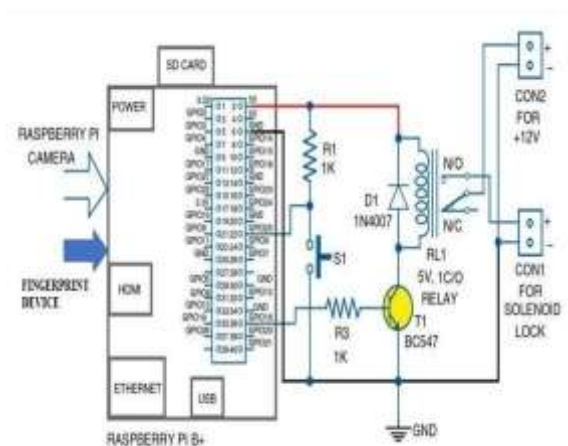


Fig.7. CIRCUIT DIAGRAM

#### STEP 1: RECOGNISING THE FINGERPRINT

First, we fix the fingerprint device at the driver's seat. If the door is opened with the help of a key, power supply is given to the fingerprint device and web camera which recognises the face.

The fingerprint should be provided, if a valid fingerprint is given the consumers will be allowed to move to the next step. If invalid credentials are given he will be unable to move to the next step.

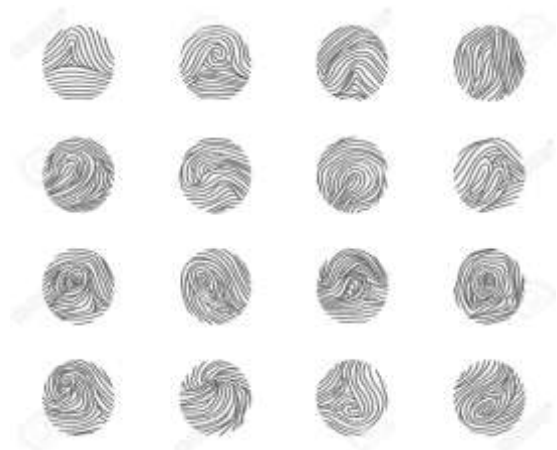




Fig.8. FINGERPRINT DATABASES STEP 2:DETECTING THE FACES

If the valid fingerprint credentials are given, then the person will be able to go to facial recognition. The camera will be placed in front of the driver's seat. If no faces are detected for more than 10 minutes, it will automatically move to neutral position and will start from first step, i.e., fingerprint detection. The fingerprint and face recognition APIs are taken from raspberry pi databases. It consists of three steps. **Step 1:**Recognising the fingerprint

**Step 2:**Detecting the faces

**Step 3:**Fingerprint and face recognition



Fig.9. FACE RECOGNITION DATASET

### STEP3:FINGERPRINTAND FACE RECOGNITION

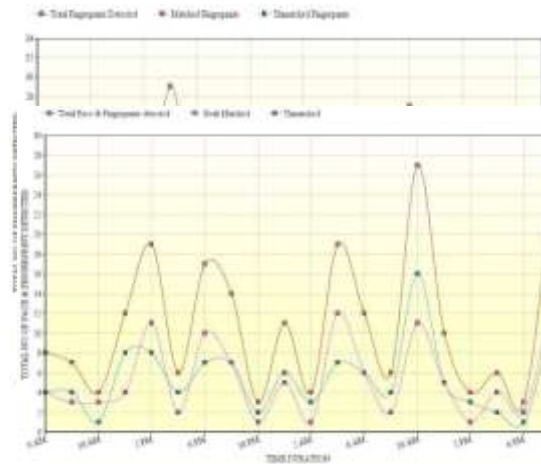
After recognising fingerprint & faces, it will be authenticated with the Raspberry pi database. Once the fingerprint & faces are matched with the Raspberry pi database it undergoes ignition process.



Fig.10. IMPLEMENTATION MODEL V RESULT AND ANALYSIS

In the result and analysis phase, the calculation is done to predict the false rate analysis and true rate analysis. We have taken three graph results. The first one implies fingerprint recognition results, and the second one implies facial recognition graph and also we have combined the results of fingerprint and facial recognition graphs and drawn a new graph of it.

Fig.11. RESULT OF FINGERPRINT RECOGNITION



The above graph indicates the results of fingerprint recognition during a single day, In the above graph, we have taken time duration as x-axis and total no. of fingerprints detected is taken as y-axis. In this we are taking a difference order as 2.

Fig.12. RESULTS OF FACIAL RECOGNITION

The above graph indicates the results of facial recognition during a single day, In the above graph, we have taken time duration as x-axis and total no. of faces detected is taken as y-axis. In this we are taking a difference order as 2.

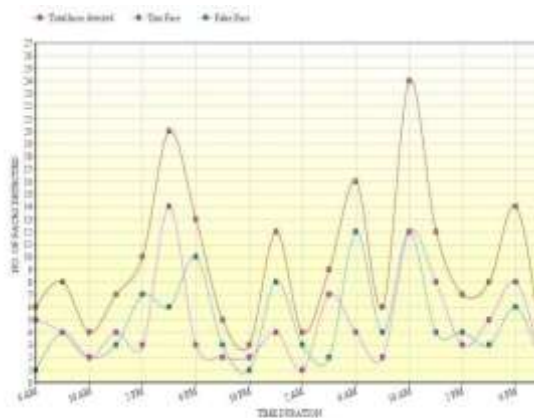


Fig.13. COMBINED RESULT OF BOTH FACIAL AND FINGERPRINT RECOGNITION

The above graph indicates the results of fingerprint and facial recognition during a single day, In the above graph, we have taken time duration as x-axis and total no. of fingerprints detected is taken as y-axis. In this we are taking a difference order as 2. In the below table, we have listed an overview of the testing no. of persons and the no. of attempts taken and also we have mentioned the success rate. We have a success rate of 98%.

Test. No	No. of attempts	No. of correct identification	No. of False Identification	Success Rate (in%)
Test-1 Right Persons (5 Persons with 10 various positions)	50	49	1	98%
Test-wrong Persons (10 Persons with 10 various positions)	100	100	0	100%

Table.1. SUCCESS RATE TABLE

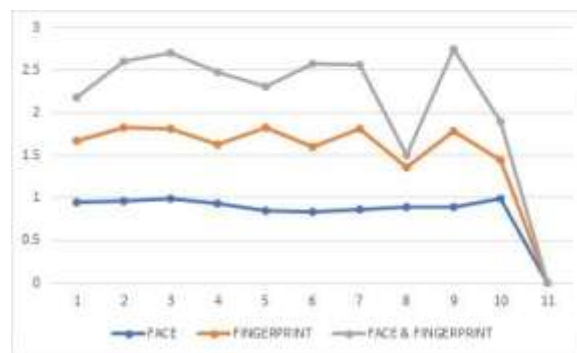


Fig.14. GRAPH ACCURACY FOR FACE & BIOMETRIC USING CNN

The fig.13 shows the accuracy and loss percentage of Face and Biometric with the help of MIT App inventor. In this, we have trained the data using Convolutional Neural Network for classification of Face & Fingerprint. We have splitted the data into three labels. Three labels are Face, Fingerprint and combined result of Face & Fingerprint with 50 sample images.

In the next step, we have calculated the number of epochs, learning rate, Batch size, layers for getting better accuracy. When the results are trained, check the testing data to classify whether the given samples are classified correctly or incorrectly. The given samples are taken for testing to predict the accuracy and loss for Face and Biometric using Personal image Classifier.

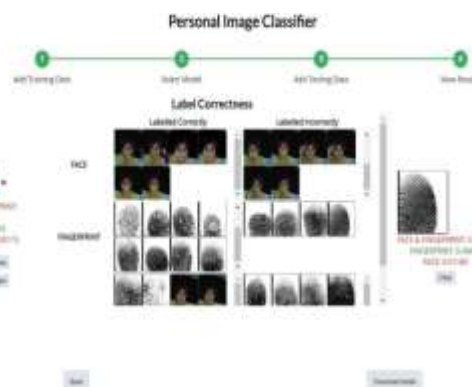


Fig.15. ACCURACY FOR FACE & BIOMETRIC VI CONCLUSION AND FUTURE

## WORK

This project deals with the Multimodal Authentication using Face and Biometric with Raspberry pi which reads the data from the raspberry pi database. This hardware communicates with the RaspberryPi and forwards the information to the Raspberry pi database. It works on Two modules namely Local Binary Pattern Histogram Algorithm & Minutiae Algorithm which helps to predict the matched values & unmatched values based on the total values detected. The false and true values are being calculated using Raspberry Module and the data is sent to the Raspberry pi cloud database by using SFTP Protocol we can able to grab data from the Raspberry pi. Therefore, the information is stored in a realtime database for the updation of information in the Webserver.

In future work, we have decided to recognise the face with age factor, so that the person below the age of 18 are restricted to start the car and if they try to access by malpracticing, immediately an alert will be sent to the nearby police station and their parents. Also we can add some more authentications which can be linked to Aadhar card using fingerprints. This can reduce complexity and improve security of vehicles.

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