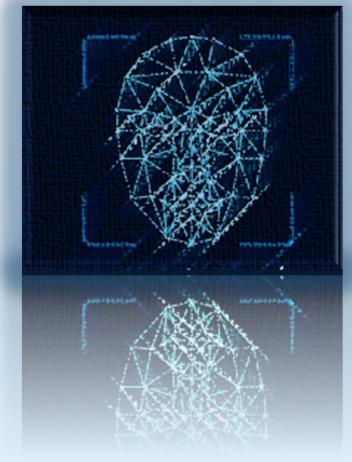
Facial Recognition for transactions or OTP

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Introduction

- The information age is quickly revolutionizing the way transactions are completed. Everyday actions are increasingly being handled electronically, instead of with pencil and paper or face-to-face. This growth in electronic transactions has resulted in a greater demand for fast and accurate user identification and authentication. Access codes for buildings, bank accounts, and computer systems often use PINs for identification and security clearances.
- Using the proper PIN gains access, but the user of the PIN is not verified. When credit and ATM cards are lost or stolen, an unauthorized user can often come up with the correct personal codes. Despite warnings, many people continue to choose easily guessed PINs and passwords: birthdays, phone numbers, and social security numbers. Recent cases of identity theft have heightened the need for methods to prove that someone is truly who he/she claims to be.
- Face recognition technology may solve this problem since a face is undeniably connected to its owner except in the case of identical twins. It's nontransferable. The system can then compare scans to records stored in a central or local database or even on a smart card.

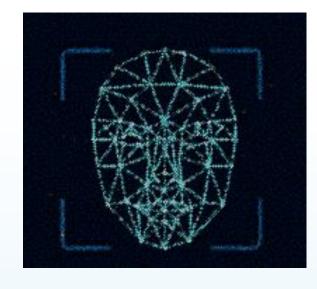
What Is Biometric?

- A biometric is a unique, measurable characteristic of a human being that can be used to automatically recognize an individual or verify an individual's identity, Biometrics can measure both physiological and behavioral characteristics. Physiological biometrics (based on measurements and data derived from direct measurement of a part of the human body) include:
- Finger-scan
- Facial Recognition
- Iris-scan
- Retina-scan
- Hand-scan

Why do we choose face recognition over other biometric?

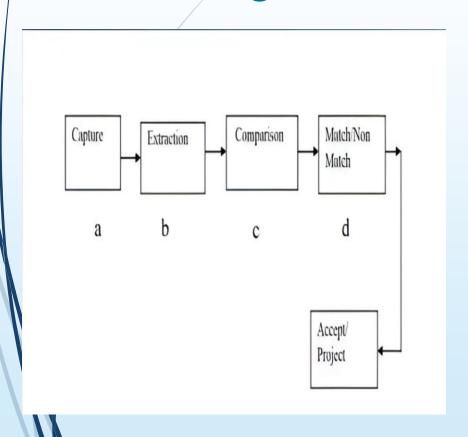
- There are a number of reasons to choose face recognition. This includes the following:
- It requires no physical interaction on behalf of the user.
- It is accurate and allows for high enrolment and verification rates.
- It does not require an expert to interpret the comparison result.
- It can use your existing hardware infrastructure, existing cameras and image capture Devices will work with no problems.
- It is the only biometric that allows you to perform passive identification in a one-to. Many environments (eg: identifying a terrorist in a busy Airport terminal

FACE RECOGNITION



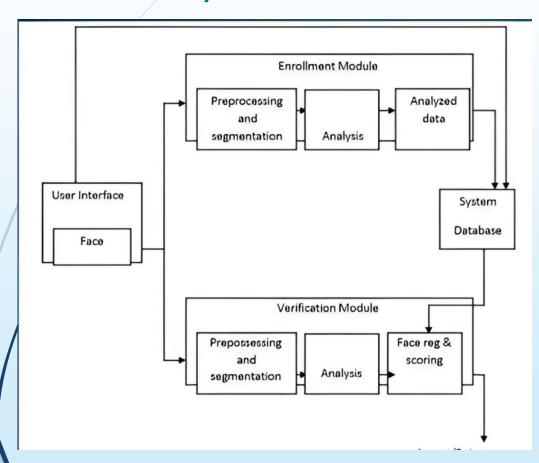
- The Face unique part.
- For face recognition there are two types of comparisons 1.
- Verification: this is where the system compares the given individual with whom that individual says they are and gives a yes or no decision.
- **Identification:** This is where the system compares the given individual to all the Other individuals in the database and gives a ranked list of matches.

All identification or authentication technologies operate using the following four stages:



- Capture: A physical or behavioral sample is captured by the system during Enrollment and also in the identification or verification process
- Extraction: Unique data is extracted from the sample and a template is created.
- Comparison: The template is then compared with a new sample.
- Match/non-match: The system decides if the features extracted from the new Samples are a match or a non

Component of Face Recognition Systems



- Enrollment module: An automated mechanism that scans and captures a digital or an analog image of living personal characteristics.
- Database: Another entity that handles compression, processing, storage, and compression of the captured data with stored data.
- Identification module: The third interfaces with the application system

Implementation of Face recognition technology

- The mplementation of Face recognition technology includes the following three stages:
- Data acquisition
- Input processing
- Face image classification and decision making

- Data acquisition: The input can be recorded video of the speaker or a still image. A sample of I See duration consists of a 25 frame video sequence. More than one camera can be used to produce a 3D representation of the face and to protect against the usage of photographs to gain unauthorized access.
- Input processing: A pre-processing module locates the eye position and takes care of the surrounding lighting condition and color variance. First, the presence of faces or faces in a scene must be detected. Once the face is detected, it must be localized. Some facial recognition approaches use the whole face while others concentrate on facial components and/or regions (such as lips, eyes, etc). The appearance of the face can change considerably during speech and due to facial expressions

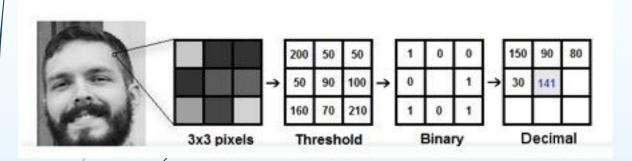
Face image classification and decision making

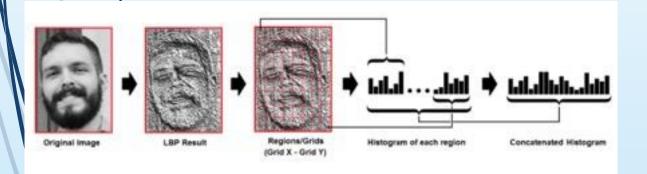
Synergetic computers are used to classify optical and audio features, respectively. A synergetic computer is a set of algorithms that simulate synergetic phenomena. In the training phase image classify BIOID creates a prototype called face print for each person. A newly recorded pattern is pre-processed and compared with each face print stored in the database. As comparisons are made, the system assigns a value to the comparison using a scale of one to ten. If a score is above a predetermined threshold, a match is declared.

How Face Recognition Systems Work

- If you look in the mirror, you can see that your face has certain distinguishable landmarks. These are the peaks and valleys that make up the different facial features. Software defines these landmarks as nodal points.
- There are about "80 nodal points" on a human face.
- Here are a few nodal points that are measured by the software:
- distance between the eyes
- width of the nose
- depth of the eye socket
- Cheek
- Bones
- jaw line
- chin

Face Bunch Graph





- A Face bunch graph is created from "70 nodal points" to obtain a general representation of a face.
- Given an image the face is matched to the Face bunch graph to find the same point.
- These nodal points are measured to create a numerical code, a string of numbers that represents a face in the database. This code is called face print.
- Only 14 to 22 nodal points are needed for FaceDePay software to complete the recognition process.