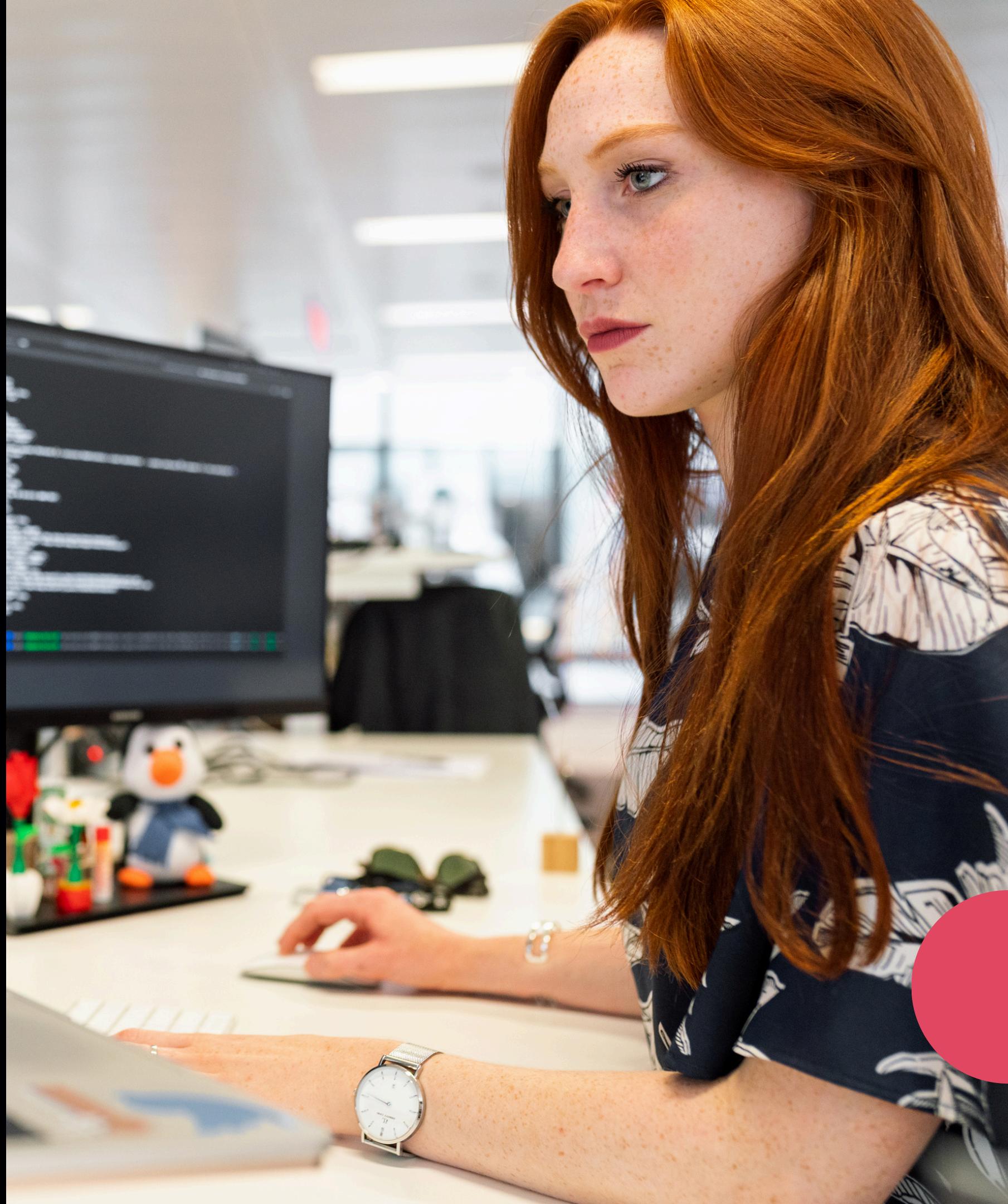


FACE RECOGNITION

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ABSTRACT

Face Recognition is aimed at advanced Face Detection and Recognition which is one of the areas of computer vision where the research actively happens.

The applications of Face Recognition include Face Unlock, Security and Defense, etc. Doctors and healthcare officials use face recognition to access the medical records and history of patients and better diagnose diseases.

In this python project, we are going to build a machine learning model that recognizes the person from an image.

When a user uploads a library of pictures PIP(package installer for python) and download it in the tech section of the code and then input the downloaded library, The code helps us compare any two pictures and detect if it's the same person or not. This kind of facial recognition system is widely used in gallery apps such as google photos

MACHINE LEARNING

Machine learning (ML) is a type of artificial intelligence (AI) that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values.

***Machine learning is
the last invention that
humanity will ever
need to make***



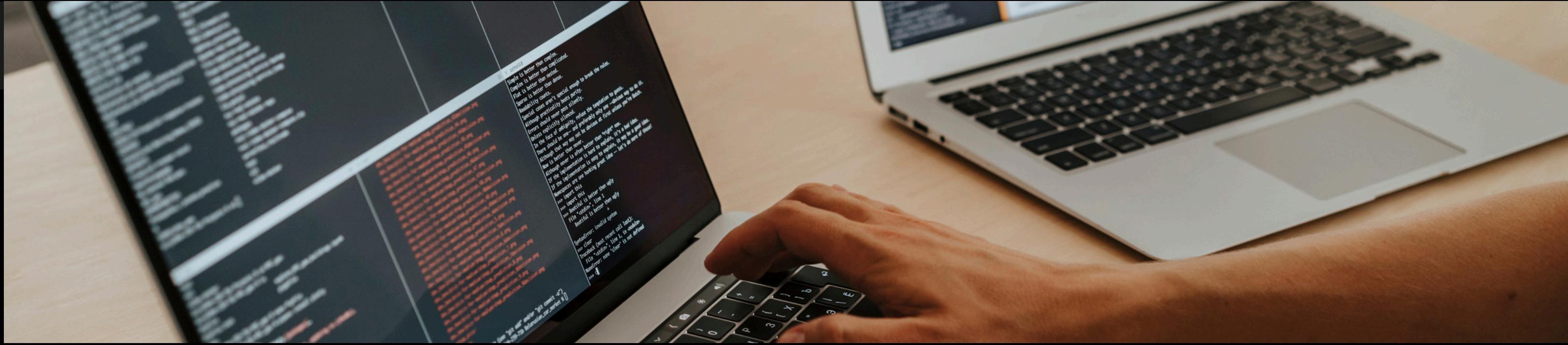


WHAT IS BIOMETRIC

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 psychological and behavioural characteristics.

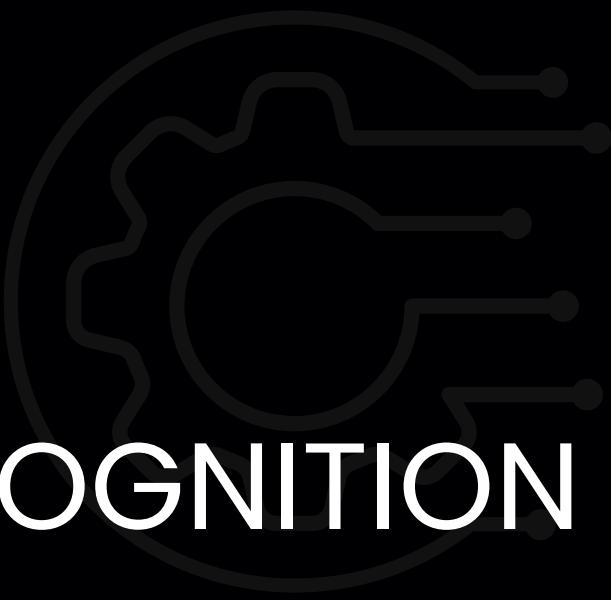
Psychological biometrics include:

- Finger Scan
- Facial Recognition
- Iris Scan
- Retina Scan
- Hand Scan



WHY DO WE CHOOSE FACIAL RECOGNITION OVER OTHER BIOMETRICS

- It requires no physical interaction on behalf of user
- It is accurate and allows for high enrolment and verification rates
- It doesn't require an expert to interpret the comparison result
- It can use your existing hardware infrastructure, cameras and image capture
- It allows passive identification in one go.



WHAT IS FACE RECOGNITION



Facial recognition is a way of identifying or confirming an individual's identity using their face. Facial recognition systems can be used to identify people in photos, videos, or in real-time. Facial recognition is a category of biometric security. The technology is mostly used for security and law enforcement, though there is increasing interest in other areas of use.

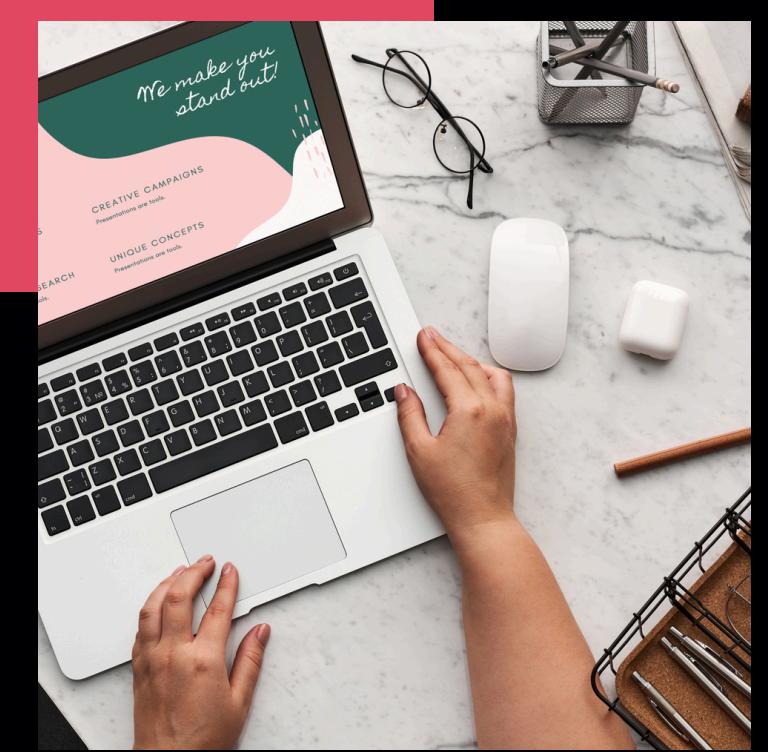
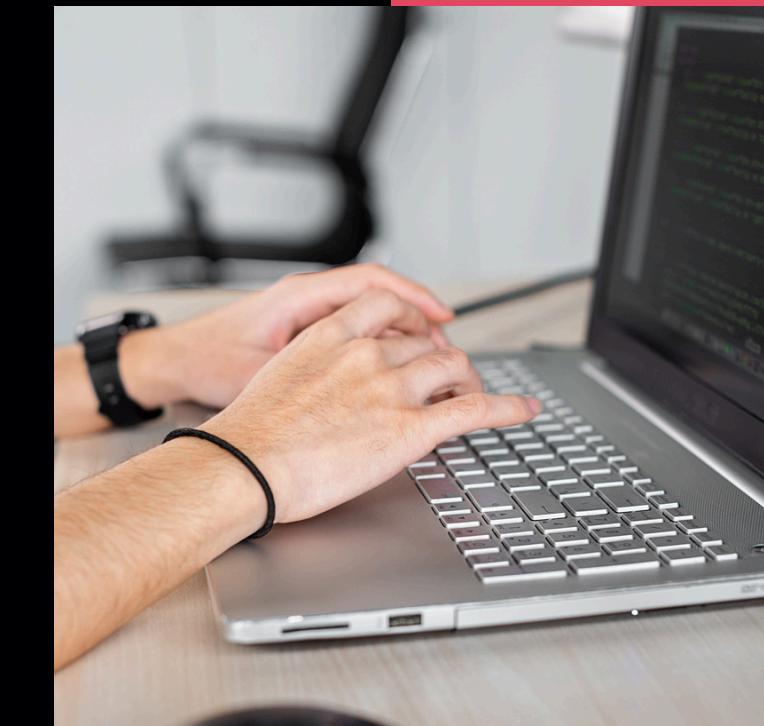
HOW IS FACE RECOGNITION DONE

01 CAPTURE

02 EXTRACTION

03 COMPARISION

04 MATCH/NON
MATCH





COMPONENTS OF FACE RECOGNITION SYSTEM

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

THE PROCESS

1. Face Detection

The process of correctly recognising faces begins with first detecting faces from a set of objects. By now, many smartphone cameras come with an inbuilt face detection module. It is also available with social media platforms such as Facebook, Instagram, Snapchat, etc., using which users can add different effects and filters to their photos.

2. Face Alignment

Faces that don't look directly at the camera or those away from the focal point are interpreted as completely different by the computer. That is why, a machine learning algorithm is needed to normalise the face in question to make it appear consistent with the faces stored in the database. This is generally done by using generic facial landmarks. These could include the outside of the eyes, top of the nose, bottom of the chin, etc. Then, the ML algorithm is trained repeatedly using different data points to locate these points on the face and turn them towards the centre to align to match the database.



THE PROCESS

3. Feature Extraction

This is another crucial step that helps extract all the essential features and characteristics from the face that will then help in the final matching of the face to other faces in the database. For a long time, it was unclear which feature should be extracted and looked for. Eventually, researchers concluded that it is best to let machines and algorithms identify the features it needs to collect for best matching. In technical terms, this process can be called embedding, and it uses deep convolutional neural networks to train itself. Then, it generates multiple measurements of the face, making it easier to distinguish the face from other faces.



THE PROCESS

4. Face Recognition

Once the unique features and measurements of the face are extracted in the feature extraction stage, another ML algorithm is required to match these measurements against other faces stored in the database. Whichever face from the database comes closest to the features will be a match for the input face.

5. Face Verification

Face verification is the last step in the entire face recognition process using the machine learning process. In this, the ML algorithm is required to return a confidence value to confirm whether the face matches or not. Depending on that, the next iterations are performed to improve the matching or declare the result.

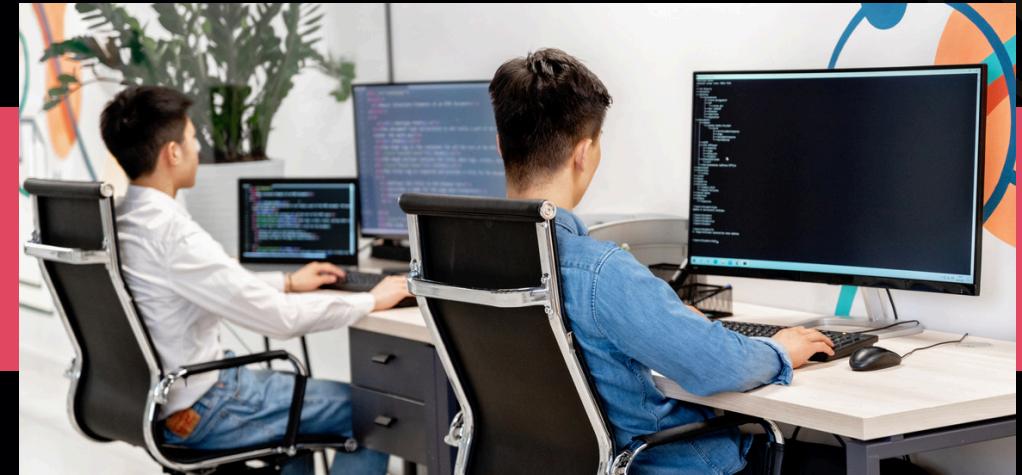


USES



Government

- Law Enforcement: Minimizing victim trauma verifying Identity for court records, and comparing school surveillance camera images to know child molesters.
- Security/Counterterrorism: Access control, comparing surveillance images to Know terrorist.
- Immigration: Rapid progression through Customs.
- Voter verification: Where eligible politicians are required to verify their identity during a voting process this is intended to stop "proxy" voting where the vote may not go as expected



Commerical

- Residential Security: Alert homeowners of approaching personnel.
- Banking using ATM: The software is able to quickly verify a customer's face.
- Physical access control of buildings areas, doors, cars or net access.

ADVANTAGES AND DISADVANTAGES

Advantages

- There are many benefits to face recognition systems such as its convenience and Social acceptability. all you need is your picture taken for it to work.
- Face recognition is easy to use and, in many cases, it can be performed without a Person even knowing.
- Face recognition is also one of the most inexpensive biometric in the market and Its price should continue to go down.

Disadvantages

- Face recognition systems can't tell the difference between identical twins.



CONCLUSION

Face recognition technologies have been associated generally with very costly top secure applications. Today the core technologies have evolved and the cost of equipment's is going down dramatically due to the integration and the increasing processing power. Certain applications of face recognition technology are now cost effective, reliable and highly accurate. As a result, there are no technological or financial barriers for stepping from the pilot project to widespread deployment

THANK YOU

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