Facial Recognition

What is it?

Facial recognition is a method of identifying or verifying a person's identity by looking at their face. People can be identified in photographs, films, or in real-time using facial recognition technology.

This technology is used in various fields nowadays, even many smartphones have this feature where they unlock only when they recognize the face of their owner. Facial recognition comes under biometric security. Voice recognition, fingerprint recognition, and ocular retina or iris identification are all examples of biometric software.

How does it work?

Facial recognition is a technology that can recognize a person only by looking at them. It uses machine learning techniques to identify, collect, store, and evaluate face characteristics so that they can be matched to photos of people in a database.

Working steps for Facial Recognition:

Face Detection (input node):

To begin, the system must find the face in the image or video. Most cameras now include a built-in facial detection feature. Snapchat, Facebook, and other social media platforms employ face identification to let users apply effects to images and videos taken using their apps. Many apps identify the person in the photo using this, they can even find a person standing in a crowd with this face detection technique.

Face Alignment (Input Node):

To a computer, faces turned away from the focal point appear completely different. To normalize the face and make it consistent with the faces in the database, an algorithm is necessary. Using a variety of generic face landmarks is one method to do this.

The bottom of the chin, the top of the nose, the outsides of the eyes, different places surrounding the eyes and lips, and so on are examples. The next stage is to train a deep learning system to locate these spots on any face and turn it towards the centre. This makes the face detection process much easier.

Face Measurement and Extraction (Input Node)

This phase entails measuring and extracting numerous characteristics from the face so that the algorithm can compare it to other faces in its database. However, it was initially unclear which traits should be collected and extracted until researchers realized that letting the deep learning system decide which data to gather for itself was the optimal method.

Embedding is a technique that employs deep [convolutional neural networks](https://www.analyticssteps.com/blogs/how-transfer-learning-done-neural-networks-and-convolutional-neural-networks) to teach itself to create numerous measurements of a face, allowing it to differentiate it from other faces.

Face recognition (Medial Node)

A final deep learning algorithm will compare the measures of each face to known faces in a database, using the unique measurements of each face. The match will be whatever face in your database comes closest to the measurements of the face in question.

Face Verification (Medial Node and Output Layer)

Now, in the end, the deep learning algorithms do the final act, which is, matching the face with other faces in the database. If the face matches, then it is said to be verified, and if it doesn’t it remains unverified. This step is called face verification. Faces are compared in it to give the result of a whole long process. But this step is a slightly complex one.

The image can be compared to the database in one of two ways. If the image obtained and the image in the database are both 3-D, the matching procedure will go smoothly. However, because most government offices and other locations use 2-D databases, the comparison becomes more difficult.

Before comparing, the 3-D picture must be transformed into a 2-D image. When compared to a still and stable 2-D image, a 3-D image will be alive and moving. As a result, when a 3-D picture is captured, it is transformed to 2-D by obtaining measurements from distinct places on the face. These measurements will then be translated to an algorithmic form, and therefore a 2-D picture will be created.

General Usage of Facial Recognition:

Unlock Phones

Face recognition is currently used to unlock a range of phones, including the newest iPhone. This technology is a strong technique to secure personal data and ensure that sensitive data is unavailable to the offender if a phone is stolen.

Protect Law Enforcement

Face recognition applications on mobile phones are already assisting police officers by allowing them to quickly identify people in the field from a safe distance. This can assist them by providing contextual information about who they are working with and whether they should continue with caution. For example, if a police officer pulls over a wanted killer during a normal traffic stop, the officer will immediately recognize that the suspect is armed and dangerous, and will call for backup.

In Forensic Investigations

By automatically detecting persons in surveillance footage or other recordings, facial recognition can help forensic investigations. Face recognition software may also be used at crime scenes to identify people who are dead or asleep.

Identifying People on Social Media

When Facebook members appear in photographs, Facebook utilizes facial recognition technology to instantly recognize them. This makes it easier for individuals to discover images in which they appear, and it also allows them to recommend when certain persons should be tagged in photographs.