A SURVEY ON THE FACE IDENTIFICATION METHODS

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Abstract:

Face Recognition is an important factor in Biometrics. A measure of feature selection is an problem in face recognition. This paper proposes a study of face recognition. There are a variety of ways to recognize facial characteristics. With some sophisticated methods, it is possible to extract features more quickly in one go of the raw image. It can also be located in a smaller space, while still retaining the facial features efficiently. The methods employed to extract facial features are able to work with low-resolution images. The method can be trained as a method for identifying facial features. Following the process of selecting features the next step is to match for recognition of faces. The accuracy of recognition is improved with the help of advanced techniques.

Keywords: *Image Classification, Face Detection, Face Spoofing, Facial Expression Recognition.*

1. INTRODUCTION

Face recognition (FR) is the process for determining or verifying the identity of a person by examining their facial features. FR devices are used to identify people in video, photographs or in real-time. Police officers can also utilize mobile devices to find individuals during police stop. However, FR data could be susceptible to errors that could make people liable for crimes that they didn't commit. FR software is particularly ineffective at recognizing African Americans and other ethnic minorities as well as women and young people. It is often unable to identify them or failing to recognize these individuals, causing disparate impact on certain populations.

Faces are our most prominent our lives, in communicating the personal feelings. We are able to recognize a variety of faces in the course of our lives and recognize faces with a glance after years of distance. The ability is quite strong regardless of massive changes in the visual stimuli caused by converting conditions ageing, distractions and other factors like the appearance of glasses, beards, or changes in hairstyle. FR is an essential aspect of human visual perception, and it is considered to be as the capabilities. Looking photo and not photo. In your day-to-day life you interact with familiar people and recognize faces all day long, without the ability to comprehend these faces without clues such. Human brain has distinct areas that provide us with our amazing face-to-face popularity abilities.

Face Rrecognition

Face recognition relies upon physical characteristics, which are easier to acquire from human compared to behavioral characteristics. Face recognition has greater advantages over other methods of identification based on biometric features. A variety of other traits require collaboration from the user to complete the acquisition of images. Face recognition is able to acquire images at a distance, without specific action by the user. This is especially beneficial for surveillance and security applications. Face recognition is not associated with any health risks and is also not intrusive (Jain and co. 2007). Face

recognition is utilized in many areas, including access control and criminal justice systems security, surveillance human-computer interaction, as well as search of mugshots. Table 1.1 provides a list of applications for face recognition (Jafri and others. 2009).

Table 1.1 Face recognition applications

Areas	Applications
Security	ATM Machine, Airports, Border Checkpoints, Seaports, Email authentication
Surveillance	Criminals, drug offenders, identification of missing children in a crowded environment
Criminal Justice	Forensics, mug-shot, post event analysis
Multi-Media	Human computer interaction, behaviour monitoring at old age and child care
Government	Driving License, Passport, National IDs, Electoral registration
Commercial	Banking, E-Commerce, etc.,

What is facial recognition?

Facial recognition is the method of making sure that you can identify the identity of an individual through their facial. It records, analyzes and evaluates patterns based on the face of the person. Face detection is an essential as it can identify and locate human faces in photographs and videos. The face capture process converts the analog info (a facial image) into digital data (data) that are based on the facial features of the individual. The face match process determines the authenticity of two faces belonging to the same person.

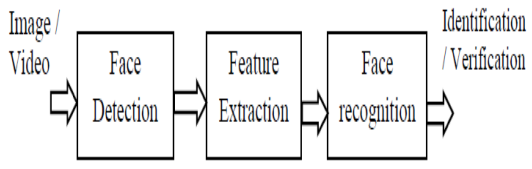


Fig 1.1: A basic FR system

In an automated system for FR facial recognition will be the first step before recognition. It's the way to determine all possible faces that could be observed at different locations with various dimensions in the image. Face detection is a technique used in a variety of applications that use computer vision. This is a model with many variations. Face detection and localization are performed simultaneously in certain systems. In other systems, face detection is initially completed and if it is positive facial localization is finished. Thus, face detection is a two-class problem in which a decision is made on which face can be seen on the photo.

Challenges And Issues In Face Recognition

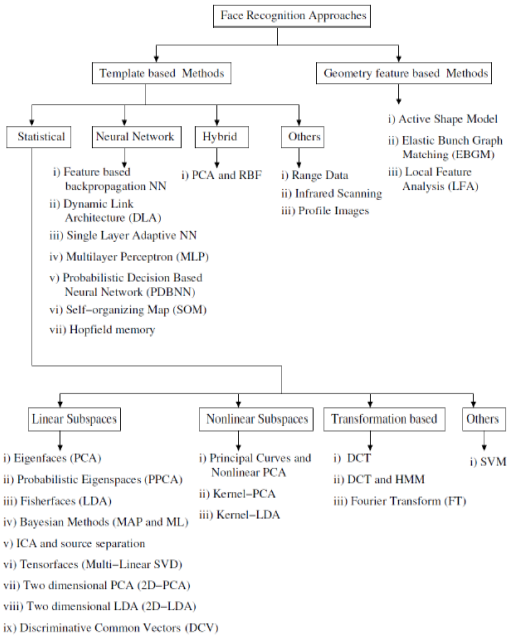
The human brain is equipped with an inbuilt facial recognition system, however, it isn't perfect in identifying a person since the human brain is unable to remember all people with accuracy. Face recognition is a specialized process that is based on the research of a known system (Biederman and colleagues. 1998; Ellis, 1986). Faces are easily recognized by people, and even a face blindness patients can see facial featureslike the eyes, nose as well as the mouth, of the individual. A facial recognition system has the capacity to manage the huge database. Human faces are not distinctive; there are a variety of elements that can cause the appearance of the face differ. Appearance can be classified as intrinsic and extrinsic aspects. The intrinsic elements comprise the intra-personal and interpersonal characteristics. inter-personal aspects focus on the various face appearances for the same individual as opposed to intra-personal factors that concentrate on the different facial features of various individuals. Extrinsic factors are

the lighting, pose, and orientation of the picture. Poor quality of the image poses, variations in pose, lighting changes, and a variety of face expressions are the primary issues making face recognition a difficult process in biometrics. The following section outlines the issues and challenges that face recognition systems face (Zhao and co. 2003; Hatem et al. (2015).

II Related Work

Recognition of faces has become a thriving research area for the last 40 years. Face recognition research encompasses many disciplines, including image processing, machine learning pattern recognition, computer vision as well as neural networks. Face recognition can be used for a variety of purposes within the field of biometrics, security systems surveillance systems, security system, security control as well as law enforcement. The drawback of the face recognition is that it requires videos or still faces of a particular scene, which allows for identifying or the presence of one or more people in the video making use of a database that is stored of facial images [Chellappa et. al. 1995]. The main issue is classification. When it comes to face recognition, it is necessary to train faces of well-known individuals, and then to classify the new tests images in one or more classes.

Face recognition can be solved easily by humans. However, limited memory is the primary issue. The limitations or issues for the machine-learning face recognition system are:



Automated Face Recognition

While the origins of FR that has been automated goes from the 1960's, it is an unsolved issue and poses a formidable. The issue is that, even though faces are believed to be distinctive but statistically, they're quite alike. This, along with the many possibilities of variations in photos of the same person caused by modifications in posture, expressions and illumination. This makes this seemingly easy task a challenge. A significant amount of mental effort is required for recognizing faces. In addition to the bursiform and gyrus, numerous areas of the brain play a role in this. In terms of computation, advanced and reliable algorithms are needed to classify faces. There is often more variation in the images of the same person taken from different perspectives than the images of individuals with the same view (Adini and co. 1997). FR is essentially an inside-category discrimination, and is a much more challenging task as compared to general recognition that is, identifying objects with distinctive forms.

Machine Learning for Face Detection

Although face detection and eye detection are popular research subjects of eye-pairs hasn't been extensively studied. Locating the location and dimension of an eye-pair on images that contain the face could allow the application of FR to determine features of faces that are related to various objects. In addition, it lets you match faces in a way in order to get more accurate detection results are achieved. As far as we know we have only one eye-pair detection device that is an element of the Viola-Jones object detection framework.But, as we'll discuss in this chapter the eye-pair detector in this framework isn't highly accurate in finding eye-pairs across different facial images.

The history in facial recognition technologies:

On a tablet with images, the user has identify the exact location of facial features like the pupil centers located in the middle and outer corners of the eyes and also high-points of windows within the hairline. They were able to calculate 20 distances. This included the mouth's dimensions and the size of the eyes. Humans can process around 40 images per hour with this method, and therefore make an archive of calculated distances. The computer will then provide closed files that may have a matches. It was in 1970 that Takeo Kanade demonstrated an algorithm for face-matching that could identify facial structures like the chin, and measured facial features' distance without human involvement. Further tests proved that the technology was unable to detect facial features accurately. However, curiosity about the subject grew as of 1977. Kanade made the initial thorough study on the technology of facial recognition.The FR systems that were used within research facilities were analyzed and analyzed.

Techniques for face recognition:

Humans are able to recognize faces quickly However, facial recognition can be a difficult pattern recognition issue that computers create. The FR systems are designed to detect the face of a person, which is tridimensional and alters its appearance when light levels change as well as facial expressions. It is based on the representation of 2 dimensions.

Human identification an extended distancia (HID)

In order to allow the human-like identification of distant (HID) high-quality images of people are enhanced by the hallucination of faces. In CCTV images, faces are typically tiny. Face hallucination techniques are employed to make images in which faces are concealed. The disguises, such as sunglasses, are eliminated and the algorithm used to create face hallucination could be applied to a photograph. The algorithms for face hallucination have to be trained using similar facial images that have the same features with or without disguise. To fill in the space which is not covered by the mask, face hallucination algorithms must be able to accurately depict the entire face's state. This could be impossible because of the instantaneous facial expressions recorded in the low-resolution image.

Recognition in 3-D:

The technique of 3D FR utilizes 3D sensors to collect details about facial

characteristics. The data can be used to determine distinct features of facial features like the shape of the nose, the eye sockets and the chin. One of the advantages of 3D facial recognition software is that it isn't dependent on the changes in light intensity as other methods do. It is also able to recognize faces using a variety of angles that includes angles. The three-dimensional data points on an individual's face dramatically enhance the quality in facial recognition.

IMPORTANCE OF FACE RECOGNITION

Biometric Recognition Systems are a way that can establish the identity of an individual by his physical or behavioral characteristics (Jain et al, 2004). FR technology has experienced exponential growth in recent times for Law Enforcement, Biometrics, and Security as well as in other sectors. Biometric-based technologies permit recognition based on behavioral and biological characteristics of person. The biometric method used in FR has numerous benefits over other biometric methods for identification like fingerprinting, hands geometry recognition retina, and recognition of the iris and also signatures. Each of these techniques requires action by an individual user. For instance, the user needs to rest his hand on a hand rest in order to permit hand geometrical or fingerprinting to be detected. Additionally, user needs to sit in a fixed position before the camera in order to enable Iris as well as Retina recognition. They also require high-end equipment that is more sensitive to movements of body. Voice recognition is also sensitive to noises in the background of public spaces and the sound can change within a telephone line and the tape recorder. There is a greater risk that security systems using signatures can be altered or copied and could lead to counterfeiting. If a lot of people use same device to capture their biometrics it is possible of transmitting germs from one person over to someone else. Face pictures are easy to obtain by using inexpensive fixed cameras. The top FR algorithms and the proper processing of photos will make up for blur and small changes in the size, orientation, and light.

III. DISCUSSION AND REMARKS

This paper has discussed several major concerns regarding face recognition. They are Face detection: In the constraints most face detection methods for static images aren't appropriate for the job in video. We divided current methods into groups and then reviewed their advantages and disadvantages. Face tracking: In face tracking, the head's rotation as well as pose changes are issues of measurement. Face tracking is an important process in facial recognition. It usually uses statistical models or exemplar-based models, as well as skin colour information to complete the task of tracking. Additionally, for these techniques, it can also use CAMSHIFT condensing, and adaptive Kalman filters.

Face recognition: Because the spatio-temporal information plays an crucial role in the process of recognizing faces in maximizing the redundancy information within videos is an essential problem for facial recognition using video. One of the main advantages of using video instead of still images is that the accumulation of multiple frames could result in improved face recognition capabilities. Face recognition in video poses greater challenges for the existing face recognition

technology. Utilizing three-dimensional face models is a possible method to overcome low resolution, small dimensions low contrast, and non-frontal poses. The method of building an 3D face model using many non-frontal images in the video, then creating a frontal view using the created 3D models, then then applying the 2D face recognition technique to identify the frontal model that has been synthesized spatial and temporal information will be utilized to its fullest. In the meantime, it can assist in solving the problems of pose variance, occlusion and lighting issues that are caused by poor video frame quality.

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