A Survey on Face Recognition Techniques

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Abstract: Face recognition is one among several applications of digital image process. It involves the automated identification of a private in an exceedingly digital image. There are several algorithms through which this process may be carried out. Here, we have a tendency to describe techniques and implementation elements of face recognition.

Keywords: Structure, Applications, Challenges, Implementation elements, Methods.

I. INTRODUCTION

Face recognition could be a quickly growing field. Nowadays several uses within the areas of identity verification, security, and lots of alternative areas. There square measure several issues that exist thanks to the various factors that may have an effect on the photos. Once process pictures one should take into consideration the variations in lightweight, image quality, the persons create and facial expressions at the side of others. So as to with success be able to determine people correctly there should be how to account for of these variations and be able to return up with a sound answer.

II. STRUCTURE OF FACE RECOGNITION

In this report, we have a tendency to specialize in image-based face recognition. Given an image was taken with a camera, we'd wish to apprehend if there's a person within, wherever his/her face locates at, and United Nations agency he or she is.
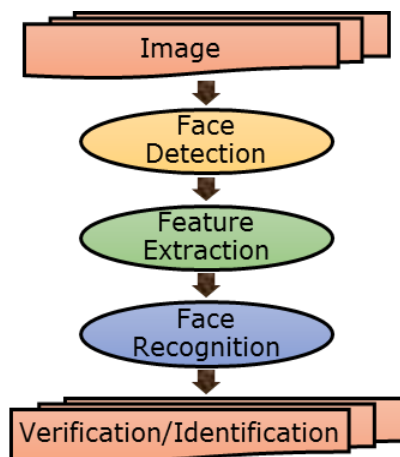

Fig 1: General face recognition structure

Our system aims at the automatic detection of text. This is done by the algorithm. Fig. 1 shows the flow diagram of text

detection algorithm. The algorithm steps are summarized as follows.

A. Face Detection

Find all faces in a picture (if any) in spite of their position, scale, in-plane rotation, poses, illumination, facial expressions, and occlusions.

B. Feature Extraction

Human-face patches area unit extracted from pictures. A face piece is typically remodeling into a vector with fastened dimension or a collection of fiducial points and their corresponding locations.

C. Face Recognition

In this phase, a face database is required to create. For every person, many pictures area unit taken and their options area unit extracted and held on to the information. Then once an input face image comes in, we perform face detection and have extraction, and compare its feature to each and every face class that hold in the database. Two primary applications used in face recognition i.e.:-

- Identification: Given a face image, we would like the system to inform Organization he or she is or the most probable identification

- Verification: Given a face picture and a guess of the credentials, we wish the system to inform true or false concerning the guess.

III. APPLICATIONS OF FACE RECOGNITION

There are primary forms which are as follows [1]:

Finally, complete content and organizational editing before formatting. Please take note of the following items when proofreading spelling and grammar:

A. Image database investigation

- Missing children, Forensic uses

B. Security

- Physical admittance
- Secure access to networks and substructures
- E-health, e-commerce, e-banking (and now cell phones)

C. Access Control

- Office access or electronic device login, the size of the group of people that need to be recognized is moderately small.

D. General identity verification

- National ID, passport, driver's license, border control

- Banking, electronic registration, identifying newborn baby

E. Surveillance

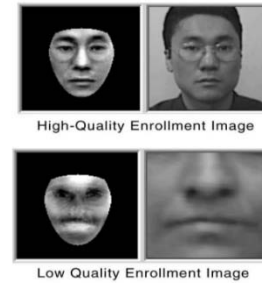- Municipal spaces (Airports, Railway stations, etc.).

IV. CHALLENGES OF FACE RECOGNITION

There is also some challenges which are facing in recognition due to some circumstances. These are [2]:

A. Intrapersonal distinctions
1) Pose variations
2) Facial expressions
3) Use of makeup, accessories, and hairstyles

B. Interclass similarity
1) Doubles
2) Relations
3) Strangers may lookalike

C. Illumination Variations
1) 40% images taken in outdoors
2) Changes in light direction

D. Pose Variations
1) Different view angles of same subject images

E. Facial expressions
1) Facial muscle activities may expressively distort the face surface.

F. Disguises
1) Avoid recognition

V. IMPLEMENTATION ELEMENTS

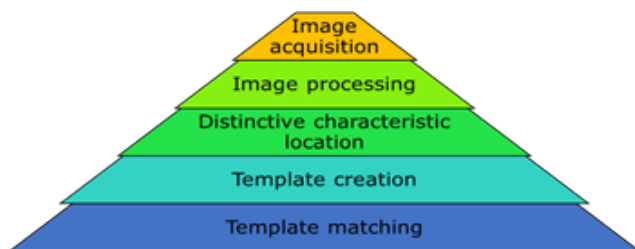Following technologies are used [3]:

Fig 2: Phases of face recognition implementation

A. Image Acquisition

- Facial-scan technology can acquire faces from almost any static camera or video system that generates images of sufficient quality and resolution.

Fig 3: Quality of Image Enrolment [3]

B. Image Processing

- Images are cropped such that the ovoid facial image remains, and color images are converted to black and white to facilitate initial comparisons based on grayscale characteristics.

C. Distinctive characteristic location

- All facial-scan systems attempt to match visible facial features in a fashion similar to the way people recognize one another.

D. Template creation

- Enrolment templates create from a multiplicity of processed facial images.

E. Template matching

- It compares match templates against enrolment templates.

VI. METHODS OF FACE RECOGNITION

Face recognition is such a severe problem that it's attracted researchers who have completely different backgrounds: psychological science, pattern recognition, neural networks, Desktop vision, and graphics. There are following methodologies used in face recognition [1]:
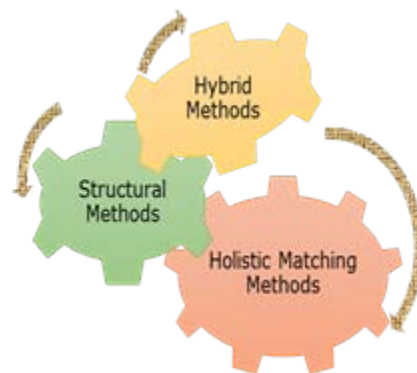

Fig 4: Methods of face recognition

A. Holistic Matching Methods

- A holistic approach, the whole face region is taken into account as input data into face catching system. One of the best examples of holistic methods is Eigenfaces [4], Principal Component Analysis, Linear Discriminant Analysis [5] and independent component analysis, etc.

B. Structural Methods

- In this strategy, essential features like as eyes, nose, and mouth are 1st of all extracted and their locations, and native statistics (geometric or appearance) are being fed into a structural classifier. An enormous challenge for feature extraction strategies is feature "restoration", this is often once the system tries to retrieve options that are invisible because of massive variations.

C. Hybrid Methods

- Hybrid face recognition systems use a combination of both holistic and feature extraction methods [1]. In hybrid strategy, 3D technology is used. The image of a human face is caught in three dimensions, permitting the system to notice the curves of the eye sockets, For Instance, or the shapes of the chin or forehead.

VII. CONCLUSION

It is crystal clear that all fundamentals of face recognition are understood. Face recognition may be a quickly growing field nowadays for its several uses within the areas of identification, security, and lots of alternative areas. There are several issues exist because of the various factors which will have an effect on the images.

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