

An Overview of Face Recognition Algorithms

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Abstract: As in the environment importance of security is increasing, So for organization identification and authentication is also important. The face recognition methods have become a key technology in various areas: access control in buildings; access control for computer in general or for ATMs in particular day-to-day affairs like withdrawing money from bank account or dealing with the post office; or in the prominent field of criminal investigation. Such requirement for reliable personal identification in computerized access control has resulted in an increased in biometrics and in the main field the face recognition. Face recognition is a biometric method of identifying a person based on a photograph of his face. The quality of the computer recognition system is dependent on the quality of the image and mathematical algorithms used to convert a picture into numbers. Important factors for the image quality are light, background, and position of the head. There are different kinds of algorithms for the face recognition. The different algorithms for the face recognition differ in their behaviours, but the analysis follows the same steps. The first step is image acquisition; once the image is captured, a head is identified. In some cases, before the feature extraction, it might be necessary to normalize the image, and then begins feature extraction using one of the algorithms. For any given computer vision problem, there are numerous algorithms designed to solve it. The design of each algorithm is based on a set of decisions and assumptions. These algorithms are able to recognise the face from small and large database. These algorithms have different features and are 2-D or 3-D based. These algorithms are divided in different categories based on the approach used for the face recognition. Also different types of databases are available for face recognition like FERET, Asian and Korean etc.

Keywords: Face Recognition, biometric, FERET

I. INTRODUCTION

Facial recognition system have been getting a lot of attention from researchers and corporate around the world as it is a fast growing, challenging and innovative area in real time applications. The recognition of human face is the problem that attracts researchers from disciplines such as psychology, computer art, graphics, neural networks, image processing and human behavioural scientists. It is a process of identifying, validating and verifying a person by using a digital image and comparing that image with the available database of images and other features.

II. FACE RECOGNITION

Facial recognition is about identifying a person based on a photograph of their face using biometric methods. Biological traits are used to identify people. These methods are under development since 1980s. The first commercial system was launched in market in 1990s. The first trial of this technology was done in tampa bay, florida, in year 2000 during Super Bowlxxxv. All the spectators were photographed as they entered the stadium without their knowledge. The obtained images were then compared with the police database. Currently this technology is defence services, forensics, governments,

private companies, casinos and security agencies. Around the globe mostly all the countries use facial recognition for identity verification.

III. SIGNIFICANCE OF THE STUDY

Today the Face Recognition technique has got its importance in various public and private sectors. And the present research work is supposed to help the multiple users for e.g. the police, forensic scientists, governments, private companies, the military, custom and immigration and casinos etc. The police use facial recognition for identification of criminals. Companies use it for securing access to restricted areas. Casinos use facial recognition to eliminate cheaters and dishonest money counters. The National Centre for Missing and Exploited Children uses the technique to find missing children on the Internet. The use of facial recognition is important in law enforcement, as the facial verification performed by a forensic scientist can help to convict criminals. The results of this comparative study are intended to be a guide for developers of face recognition systems.

IV. OBJECTIVES OF THE STUDY

The basic objective of the present study is to study the various aspects of Face Recognition. As different Face

recognition algorithms are used to find the matching faces, so is the basis of Nodal points through which a particular algorithm recognizes the face. With the results of this comparative study, it's easy to analyse that which face recognition algorithm is better for various circumstances.

The sub-objectives of the present study are following:

- To study the problems found in Face Recognition.
- To compare the analysis of various techniques of Face Recognition.
- To study the Database related to Face Recognition.
- To find which algorithm is suited as the best as per the comparative circumstances.

V. RESEARCH METHODOLOGY

The present study is based on the exploratory methods of doing research. The purpose is to analyze the data and to explore the possibilities of obtaining as many as relationships possible. The research work provides a basis for these general findings.

- The problems of face recognition is studied and different face recognition algorithms are discussed.

- Then different algorithms used for Face Recognition are compared on the basis of variant attributes, conditions (size of database, expressions etc) and the studies carried earlier.

VI. DATA COLLECTION AND ANALYSIS

During the research work as per the requirement variety of tools have been used like libraries and internet. These tools are helpful in different manners such as for collection and analysis of data. In the present work both quantities and qualitative approaches have been applied for the analysis of data. The analysis of data has been done on the basis of various variable e.g. Position and movement of Head, Hair style, Facial expressions, Light, Facial hair, Design of jaw and Nodal points of the face.

VII. FINDINGS OF THE STUDY

The present research study is based on a comparative analysis of various approaches of face recognition techniques. These techniques can be defined with the use of existing face recognition algorithm approaches as Eigenfaces and Fisherfaces.

ALGORITHM		FEATURES					
		Face Position	Size of Database	Colour	Same Face Resemblance	Expression	Remarks
Eigenfaces	PCA	Works in 2D environment	Works best with small database	Robust	Sometimes works well and sometimes not	Less sensitive	*Better works in colourful environment *Works well with still data
	Garbor Jet	Works in 2D environment, works well with rotation	Works well with small database	Does not matter	Uncertain	96% sensitive	Gives better environment to work with
Fisherfaces	3D VFR	Also works in 3D environment	Works well with small database	Grey Level	Can Recognise	Better sensitivity than PCA	*Better than PCA *Complex to calculate *Not easy in daily life
	Eigen	Works in 2D Environment, Sensitive to face position	Can work in large database	Robust	90% Recognition	Less sensitive than Garbor Jet	*Easy to solve *Simple to use

Comparison of different face recognition algorithms

This present research study contains the comparison of different algorithms that are used for face recognition. The present research study concludes that the Eigenfaces algorithms would work better in the 2-D environment and the computational work is also less to do. But when the user has to recognize face in 3-D environment then the Fisherfaces algorithms are better to use. These algorithms provide good results when the users take into account the expressions of the face during the recognition of the face. As the study carried out tells that 3D methods are better for face recognition but, they are complex in computational form.

The present research work can be a helping tool to the designers of face recognition softwares to decide which algorithm is to be opted as a best possible solution for the face recognition in future.

VIII. REFERENCES

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