

Analysis of Face Recognition

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Abstract—

Face plays major role in social communication for conveying identity and feelings of person. Persons have amazing ability to identify different faces than machines. So face recognition plays major role in face recognition, facial idiom recognition, head-pose estimation, human computer interaction, etc. Face detection is a computer technology that determines the location and size of human face in arbitrary image. This paper presents all comprehension and critical survey of algorithms through which face recognition is possible General.

Keywords— Face recognition, eigenface, eigenvalues, PCA, ANN

I. INTRODUCTION

Early efforts in face detection have dated back as early as the beginning of the 1970s, where simple heuristic and anthropometric techniques [1] were used. These methods are basically reliable on different hypothesis such as frontal face, fixed or plain background, Passport size photograph scenarios. If any changes are occur in conditions, faces in image are not detected. At the beginning of 1990's [2] techniques are proposed focused on the face recognition and video coding systems on and increase the need of face detection. More robust segmentation schemes have been presented, particularly those using motion, color, and generalized information. The use of statistics and neural networks has also enabled faces to be detected from cluttered scenes at different distances from the camera.

Face recognition methods whether linear or nonlinear are classified into three groups handling occlusion in face images i.e., feature based methods that deal with features like eyes, mouth, nose [46] and establish a geometrical correspondence between them. The second category is appearance-based methods that focus on the holistic features of face images by considering the whole face region and a third class deals with the hybrid local and global features of face images to be used for recognition purpose. Based on these classes a survey is conducted to analyze each individual technique in handling the partial occlusion dilemma and the enhancements made by various authors to tackle the issue. Also, listed in the text are the databases on which experiments were conducted and results were extracted after performing the tests.

The human face plays an important role in our social interaction, conveying people's identity. The facial recognition process normally has four interrelated phases or steps. The first step is face detection, the second is normalization, the third is feature extraction, and the final cumulative step is face recognition. These steps depend on each other and often use similar techniques. Face Recognition System is a computer based digital technology and is an active area of research. The Face Recognition System has various applications like various authentication systems, security systems and searching of persons etc. These applications are cost effective and consume less time. Moreover the face database can be easily designed by using any image of the person. In last few years different face recognition techniques are purposed with successful results.

A whole face recognition system proposed is based on PCA feature extraction Using Neural Network. Normalization can used to eliminate the redundant information interference. Principal Component Analysis (PCA) can be used for feature extraction and dimension reduction.

II. LITERATURE SURVEY

As a preprocessing algorithm of input face image, this method computes the Eigenfaces through PCA and expresses the training images with it as a fundamental vector. In this reviewed various techniques for face detection such as feature extraction. Classification schemes and databases for face recognition [3]. It gives focus on CCA was applied to the classical PCA features to form the coherent features for recognition, but it is applicable to other holistic face recognition features such as independent component analysis and discrete cosine transform features, which might improve the recognition performance further [4]. In that [5] has explored a noble face recognition algorithm which integrates the principal component analysis; back propagation neural network (BPNN) and discrete cosine transform (DCT) to improve the performance of face recognition algorithms. PCA is used to reduce the dimensionality of face image and the recognition is done by the BPNN for efficient and robust face recognition. DCT is an exact and robust face recognition system used in compression due to its compressed representation power. DCT reduce the amount of time required to recognize a face. It adopted the global features for extraction using PCA [6] based Eigenfaces computation method and the detection part is completed using multi layered feed forward Artificial Neural Networks with back propagation process. The learning process of neurons is used to train the input face images with 1000 iterations to reduce the error. In that, face recognition task is completed with improved accuracy and success rate even for noisy face images. It [7] has given brief introduction of the PCA and the self-organizing map (SOM) neural network which are the heart for the design and implementation, these are the final algorithms used for the design of an efficient high-speed face recognition system.

In that [8] given brief introduction about feature extraction Using DCT. DCT reduces the dimension of data to avoid singularity and decreases the computational cost of PCA. In this, various DCT feature extraction approaches are considered and a new efficient approach is proposed.

III. PROPOSED WORK

In this survey it is proposed to carry out study of face recognition systems. When number of human being turn out to be too large then it is become difficult to finding the optimization for such a larger entries manually it too much time overwhelming. It is resourceful methods to solve this using MATLAB software.

A. PCA Algorithm

PCA was invented in 1901 by Karl Pearson. PCA is variable reduction procedure and useful when obtained data have some redundancy. This will result into reduction of variable into smaller no. of variables which are called Principal Component. The major advantage of PCA is using it in Eigenfaces approach which helps in reducing the size of the database for recognition of a test image. The images are stored as their feature vectors in the database which are found out projecting each and every trained image to the set of Eigen faces obtained. PCA is applied on Eigen faces approach to reduce the dimensionality of a large data set.

The other main advantage of PCA is that once you have found these patterns in the data, and you compress the data, ie. By reducing the number of dimensions, without much loss of information. This technique used in image compression, Principal Components Analysis on a set of data.

I am going to use my own made-up data set. It's only got 2 dimensions, and the reason why I have chosen this is so that I can provide plots of the data to show what the PCA analysis is doing at each step.

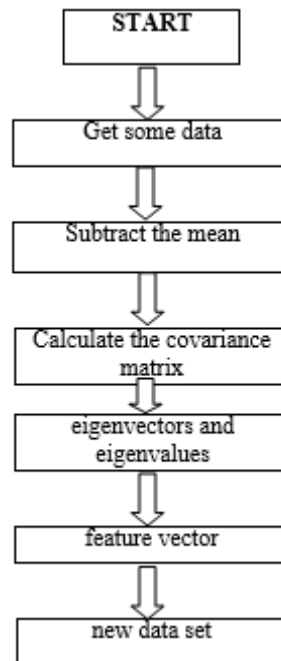


Fig 1: Block Diagram of PCA

IV. FEATURE ANALYSIS

A. Feature Searching

The method relies on the use of simple Haar-like features that are evaluated quickly through the use of a new image representation. Based on the concept of an —Integral Image it generates a large set of features and uses the boosting algorithm AdaBoost to reduce the over complete set and the introduction of a degenerative tree of the boosted classifiers provides for robust and fast interferences. The detector is applied in a scanning fashion and used on gray-scale images, the scanned window that is functional can also be scaled, as well as the features evaluated.

B. Image Base Approach

Neural networks gaining much more concentration in many pattern recognition problems, such as OCR, entity recognition, and autonomous robot driving. Since face detection can be treated as a two class pattern recognition problem, various neural network algorithms have been proposed. The advantage of using neural networks for face detection is the feasibility of preparation a system to capture the complex class conditional density of face patterns. However, one demerit is that the network architecture has to be extensively tuned (number of layers, number of nodes, learning rates, etc.) to get incomparable performance.

C. Applications

Face recognition technology can be helpful and compulsory in a large range of applications. Such as

- Biometric identification
- Video Conferencing
- Human – Computer Interaction
- Access control Systems

V. CONCLUSION

This survey deals with a variety of methods that have tried to overcome the problem of fractional occlusion. Many authors have worked on face recognition systems beneath controlled environments but through abandoned conditions less work has been focused. In this paper a classification is made among different methods i.e., parts based methods, fractals based methods and feature based methods particularly related to partial occlusion. Among them most of the work has been done on part based methods where the face image is divided into non-overlapping blocks and then analyzing the individual blocks using any parts based scheme. Similarly less work has been focused on fractal-based approach. Image misalignment is another new area of research where many loopholes are still to be handled. Regarding occlusion; since it's based on the appearance of image where the corresponding pixels are distorted, so part based methods are more effective. Also occlusion affects spatial domain of the image, so these methods are more appropriate. Further improvement that can be made when dealing with partial occlusion is that hybrid biometric capabilities can be used to enhance the performance. Since all the work done so far deal with 2D face recognition approaches, results can be better further if 3D face recognitions techniques are employed to deal with

Partial occlusion. Basically main emphasis of conducting this survey is to group together all the work related to partial occlusion in face images into one document. This effort gives an opportunity to other authors if they want to do more research in this regard.

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