STUDY OF FACE IMAGE RETRIEVAL AND RECOGNITION TECHNIQUES

[1]NUZHAT MOBEEN,[2]VIDYASHREE G L

[1] LECTURER,[2]LECTURER

[1]COMPUTER SCIENCE AND ENGINEERING, [2]COMPUTER SCIENCE AND ENGINEERING

[1]GOVERNMENT POLYTECHNIC BELLARY, BELLARY,INDIA [2]GOVERNMENT POLYTECHNIC CHANNAPATNA,INDIA

Abstract : Each individual has an inimitable face with distinctive features**.** Now days the process of image retrieval is widely used in may real life applications from large datasets. An automatic face recognition system is widely used in Face authentication and face identification systems. To be dependable, face recognition systems have to work with high precision and accuracy. The process of retrieving the images from the big images dataset is called as content based image retrieval (CBIR). These CBIR techniques are adopted recently in many image based applications like fingerprint matching image retrieval, face based image retrieval, and attribute based image retrieval. In this paper, first we present the review of Image Retrieval methods, after that different face recognition methods are discussed.

I. INTRODUCTION

There are many image retrieval systems available for automatic retrieval of images from large image dataset. There are two types of image retrieval systems such as content based and text based image retrieval. For the text based system, text annotation is done manually for all images and then used by a database management system to perform image retrieval. This manual process may takes more time for doing so. There are two main limitations of this approach such as more resources and costs are required to do the manual image annotations and the process of explaining the contents of image highly subjective the primary goal of CBIR system basically features Extraction and matching these features works on each dataset with queries image in color, shape and texture features. Based on this extracted features contents are matched and hence the results generated automatically without any manual work. Later this approach of CBIR is used in under different real time environments such as security, medical imaging, photography etc. Recently this concept is well utilized in face based image retrieval method.

In a face recognition system, the database consists of the images of the individuals that the system has to recognize. If possible, several images of the same individual should be included in the database. If the images are selected so that they account for varying facial expressions, lighting conditions, etc., the solution of the problem can be found more easily as compared to the case where only a single image of each individual is stored in the database. A face recognition algorithm processes the captured image and compares it to the images stored in the database. If a match is found, then the individual is identified. If no match is found, then the individual is reported as unidentified. The challenges of face recognition are:

Shifting and scaling of the image, Differences in the facial look (different angle, pose, hairstyle, makeup, mustache, beard, etc.), Lighting,Aging. The algorithm has to work successfully even with the above challenges.

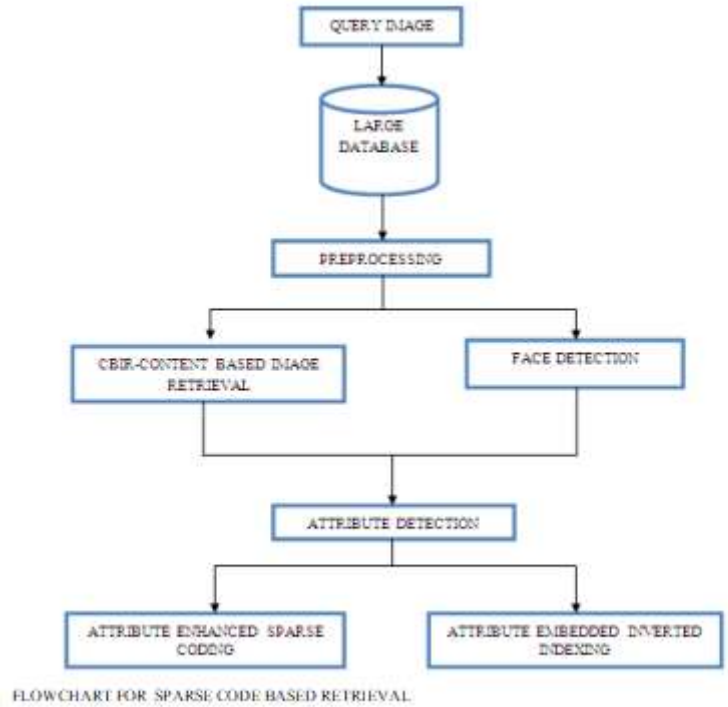
II. REVIEW OF FACE IMAGE RETRIEVAL TECHNIQUES

There are two types of image retrieval systems such as content based and text based image retrieval. For the text based system, text annotation is done manually for all images and then used by a database management system to perform image retrieval. This manual process may takes more time for doing so. There are two main limitations of this approach such as more resources and costs are required to do the manual image annotations and the process of explaining the contents of image highly subjective the primary goal of CBIR system basically features Extraction and matching these features works on each dataset with queries image in color, shape and texture features. Based on this extracted features contents are matched and hence the results generated automatically without any manual work. Later this approach of CBIR is used in under different real time environments such as security, medical imaging, photography etc. Recently this concept is well utilized in face based image retrieval method.The face based image retrieval methods are nothing but the combination of face recognition and CBIR techniques. This method is basically used for the extraction of persons images from large dataset based on input query image of same person. Internally this process works same as CBIR, only its uses the extra features like face detection, face recognition and face alignment techniques. A first, though very limited, approach to achieve this goal has been implemented in the Photo Book system, which allowed for retrieving images of persons when the face covered a large part of the image and was taken under normalized conditions. Portrait images, glasses, hats, facial expressions and facial hair with strong respect for retrieving a more complex approach is required, in a component-based descriptors for images using LDA face changes, portrait images taken from the Web are indexed in such systems are proposed for comparing performance measures. These methods have in common is that all of the image same face. In addition it assumes that to be recognized is the image of the face, the General image retrieval is not an appropriate assumption for a significant portion forms. The Image retrieval using sparse code words discussed below combines high level human attributes and low level features and does Image retrieval with promising results.

Image Retrieval Using Sparse Code Words

To analyze the effectiveness of different human attributes across datasets and find informative human attributes. To sum up, the contributions of attribute enhanced sparse codewords include: In the combine automatically detected high-level human attributes and low-level features to construct semantic codewords. To balance global representations in image collections and locally

embedded facial characteristics, in the scalable face image retrieval using attribute enhanced sparse codewords system two orthogonal methods to utilize automatically detected human attributes to improve content-based face image retrieval under a scalable framework. The method is promising for other applications as it gives real time response. Automatically detected human attributes have been shown promising in different applications recently. Kumar et al. propose a learning framework to automatically find describable visual attributes. Using automatically detected human attributes, they achieve excellent performance on keyword based face image retrieval and face verification. Siddiquie et al. Further extend the framework to deal with multi-attribute queries for keyword-based face image retrieval. Scheirer et al. propose a Bayesian network approach to utilize the human attributes for face identification.The diagram below shows the process overview.

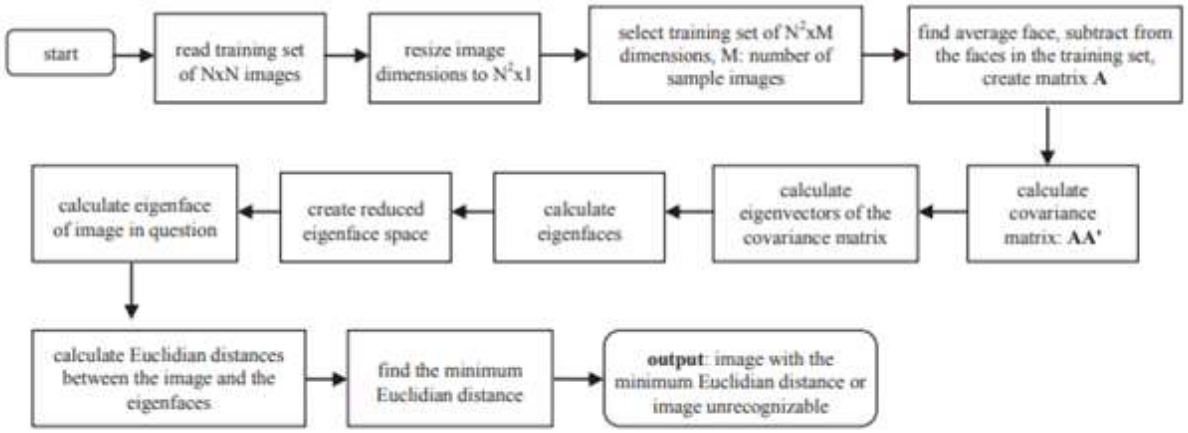


FLOWCHART FOR SPARSE CODE BASED RETRIEVAL

This indicates the dataflow of image retrieval system. The sample query image is given to the system. It is preprocessed by the system to detect the facial attributes. Based on both the content based image retrieval system and the sparse codewords the attribute must be detected. The attribute enhanced sparse codewords and the attribute embedded inverted indexing is the two main algorithm used for the image retrieval process. In this proposed system image retrieval process include two more algorithms to efficiently retrieve the image from large image database. The attribute enhanced sparse codewords used in the offline storage. It can generate the codewords to the image in the database. It split the single image into grides and generates the codewords depending upon the attributes.

III. FACE RECOGNITION

To allow for investigating the effect of face detection and representation methods, we tested two methods: detection and representation using Eigenfaces [2] and detection using the Viola & Jones method [3] and representing the face as a size normalized image patch. Both methods are data driven methods and are explained briefly in the followingThe basis of the eigen faces method is the Principal Component Analysis (PCA). A group of original face images are used, to calculate the best vector system for image compression. Then Turk and Pentland applied the Eigenfaces to face recognition problem [2]. The Principal Component Analysis is a method of projection to a subspace and is widely used in pattern recognition. An objective of PCA is the replacement of correlated vectors of large dimensions with the uncorrelated vectors of smaller dimensions. Another objective is to calculate a basis for the data set. Main advantages of the PCA are its low sensitivity to noise, the reduction of the requirements of the memory and the capacity, and the increase in the efficiency due to the operation in a space of smaller dimensions. The strategy of the Eigenfaces method consists of extracting the characteristic features on the face and representing the face in question as a linear combination of the so called ‘eigenfaces’ obtained from the feature extraction process. The principal components of the faces in the training set are calculated. Recognition is achieved using the projection of the face into the space formed by the eigenfaces. A comparison on the basis of the Euclidian distance of the eigenvectors of the eigenfaces and the eigenface of the image is made. If this distance is small enough, the person is identified. On the other hand, if the distance is too large, the image is regarded as one that belongs to an individual for which the system has to be trained. The flowchart of the algorithm is shown



Flowchart of the algorithm of the Eigenfaces method

The eigen faces are created by using the number of training images minus number of classes (total number of people) of eigenvectors. The selected set of eigenvectors are multiplied by the A matrix to create a reduced eigen face subspace. The eigenvectors of smaller eigen values correspond to smaller variations in the covariance matrix. The discriminating features of the face are retained. The number of eigenvectors depend on the accuracy with which the database is defined and it can be optimized. The group of selected eigenvectors are called the eigen faces. Once the eigenfaces have been obtained, the images in the database are projected into the eigenface space and the weights of the image in that space are stored. To determine the identity of an image, the eigen coefficients are compared with the eigen coefficients in the database. The eigenface of the image is formed. The Euclidian distances between the eigenface of the image and the eigen faces stored previously are calculated. The person is identified as the one whose Euclidian distance is minimum below a threshold value in the eigenface database. If all the calculated Euclidian distances are larger than the threshold, then the image is unrecognizable.

The reasons for selecting the eigenfaces method for face recognition are: Its independence from the facial geometry. The simplicity of realization, Possibility of real-time realization even without special hardware, The ease and speed of recognition with respect to the other methods, the higher success rate is achieved in comparison to other methods.

The challenge of the eigen faces face recognition method is the computation time. If the database is large, it may take a while to retrieve the identity of the person under question. The Eigen faces method is applied to a very large database consisting of more than 3040 images. The challenging details, such as background, eye-glasses, beard, mustache are dealt with. To increase the success rate, the eigenfaces method can be fortified with the use of additional information, such as the face triangle.

VIOLA & JONES METHOD

Viola and Jones present a new and radically faster approach to face detection based on the AdaBoost algorithm from machine learning . Boosting is a method of combining several weak classifiers to generate a strong classifier. Weak classifiers AdaBoost algorithm on statistical training and generalization error bounds is providing strong classifiers to produce a well-known algorithm. weak classifiers characteristics of three types in Viola & Jones algorithm are based on a two rectangle Sum of the values of two adjacent rectangular Windows mode is the difference between a three-rectangle feature in three adjacent rectangles understands and extreme rectangles pixels in the center of Yoga and yogic rectangle computes the difference between. A four-set of 2 × 2 rectangle feature rectangles considers and calculates that main diagonals forming rectangles and the difference between the amounts of pixels off a 24 × 14 sub-window there are more than 180,000 features.

IV. CONCLUSION AND FUTURE WORK

In this paper we have presented the review of image retrieval system and face based image retrieval system, especially the techniques of face detection and representation in image based face recognition system. We explained detailed working of content based image retrieval system as well as face based image retrieval system. In the literature there are many methods presented for face based image retrieval systems. But each method is suffered from different limitations. Face Image retrieval using Sparse code words offers a promising approach for face image retrieval.

REFERENCES

[1] A Face Recognition System Based on Eigenfaces Method Müge Çarıkçı a , Figen Özen, Procedia Technology 1 (2012) 118 – 123 2212-0173 © 2012 Published by Elsevier Ltd

[2] M. Turk and A. Pentland, “Eigenfaces for Recognition,” Journal of Cognitive Neuroscience, Vol. 3, No. 1 (1991) 71-86

[3] Viola and M. Jones, "Rapid object detection using a boosted cascade of simple features", Computer Vision and Pattern Recognition, 2001. CVPR 2001, Proceedings of the 2001 IEEE Computer Society Conference, vol. 1, (2001), pp. I-511-I-518.

[4] B. Siddiquie, R. S. Feris, and L. S. Davis, “Image ranking and retrieval based on multi-attribute queries,” IEEE Conference on Computer Vision and Pattern Recognition, 2011.