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A literature Survey on Partial face recognition by using SIFT

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Abstract- There are various method of face recognition One of that is Scale Invariant Feature Transform It provide scale invariant feature of partial face Recognition. SIFT take image and transform in to Local feature vectors. Each of these feature vectors is supposed to be invariant for scaling, rotation and Translation of image In this implementation ,we first detect keypoints of probe images and find out their local features and match with the local feature sets of the pairs of gallery and probe images.

Keywords: SIFT, AAM, Principal Component Analysis, FaceRecognition

1. INTRODUCTION

Facial Recognition System is a computer application capable of identifying or verifying a person from a digital image or a video frame from a video source One of the ways to do this is by comparing selected facial features from the image and a facial database. It is typically used in security systems and can be compared to other biometrics such as fingerprint or eye iris recognition systems. Some facial recognition algorithms identify facial features by extracting landmarks, or features, from an image of the subject's face. For example, an algorithm. In faces or face profiles, were used [Bledsoe 1964; Kanade 1973; Kelly 1970]. Over the past 15 years, research has focused on how to make analyze the relative position, size, and/or shape.

Face recognition is a biometric which uses computer software to determine the identity of the individual. Face recognition falls into the category of biometrics which is "the automatic recognition of a person using distinguishing traits". Other types of biometrics include fingerprinting, retina scans, and iris scan.

These features are then used to search forother images with matching features.Other algorithms normalize a gallery of face images and then compress the face data, only saving the data of the image that is useful for face recognition. A probe image is then compared with the face data. One of the earliest successful systems is based on template matching techniques applied to a set of salient facial features, providing a sort of compressed face representation.Active Appearance Model (AAM) endeavors to localize dozensof landmarks on facial images throughan iterative search. Jia*et al.* [1] developed an automatic facealignment method through minimizing a structured sparsity norm. However, all these face alignment methods would fail to work if the probe image is an arbitrary patch. Life scenarios, several work is done to align probe face images with training images automatically.

3D Face Recognition

3D face recognition is expected to be robust to the types of issues that plague 2D systems [4]. 3D systems generate 3D models of faces and compare them. These systems are more accurate because they capture the actual shape of faces. Skin texture analysis can be used in conjunction with face recognition to improve accuracy by 20 to 25 percent [3]. The acquisition of 3D data is one of the main problems for 3D systems

To deal with the face occlusions various algorithm are used that are work in this area where sparse representation[2] was utilized reconstruct occluded face as well as align probe face images to gallery images, they would fail if the probe image is an arbitrary face patch.

1.1 approaches

In the face Recognition process the input image is compared with the database. The input image is image face
The input image is called as probe and the database is called galleryThen it gives a match report and then the classification is done to identify the sub-population toand extraction of features such as eyes, mouth, etc meanwhile, significant ad vantages which new observations belong.[3]

There are basically three approaches for face recognition.[4]

- **Feature base approach**

In feature based approach the local features like nose, eyes are segmented and it can be used as input data inFace detection to easier the task of face recognition.

- **Holistic approach**

In holistic approach the whole face taken as the input in the face detection system to perform facerecognition.

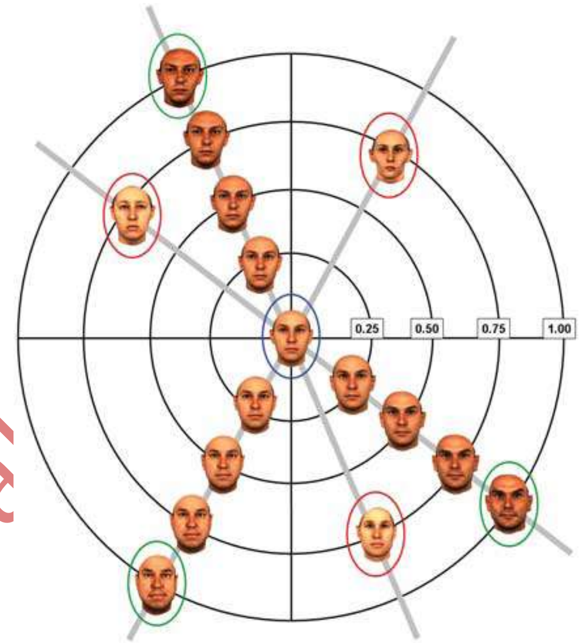
- **Hybrid approach**

Hybrid approach is combination of feature based and holistic approach. In this approach both local and whole face is used as the input to face detection system.

How Humans Perform Face Recognition

It is important for researchers to know the results of studies on human face recognition [8]. Knowing these results may help them develop ground breaking new methods. After all, rivaling and surpassing the ability of humans is the key goal of computer face recognition research. The key results of a 2006 paper "Face Recognition by Humans: Nineteen Results All Computer Vision Researchers Should Know About" are as follows:

1. Humans can recognize familiar faces in very low-resolution images.
2. The ability to tolerate degradations increases with familiarity.
3. High-frequency information by itself is insufficient for good face recognition performance.
4. Facial features are processed holistically.
5. Of the different facial features, eyebrows are among the most important for recognition.
6. The important configure relationships appear to be independent across the width and height dimensions.
7. Face-shape appears to be encoded in a slightly caricatured manner.
8. Prolonged face viewing can lead to high level aftereffects, which suggest prototype-based encoding.



Staring at the faces in the green circles will cause one to misidentify the central face with the faces circled in red. This is an example of face aftereffects [8].

9. Pigmentation cues are at least as important as shape cues.
10. Color cues play a significant role, especially when shape cues are degraded.
11. Contrast polarity inversion dramatically impairs recognition performance, possibly due to compromised ability to use pigmentation cues.
12. Illumination changes influence generalization.
13. View-generalization appears to be mediated by temporal association.
14. Motion of faces appears to facilitate subsequent recognition.
15. The visual system starts with a rudimentary preference for face-like patterns.

16. The visual system progresses from a piecemeal to a holistic strategy over the first several years of life.
17. The human visual system appears to devote specialized neural resources for face perception.
18. Latency of responses to faces in infer temporal (IT) cortex is about 120 MS, suggesting a largely feed forward computation.

Facial identity and expression might be processed by separate systems

2. LITERATURE SURVEY

The earliest work on face recognition can be traced back at least to the 1950s in psychology [Bruner and Tagiur in 1960s in the engineering literature [Bledsoe 1964]. Some of the earliest studies include work on facial expression of emotions by Darwin [1972] and on facial profile-based biometrics by Galton [1888]. Face recognition problem has been formulated as recognizing three-dimensional (3D) objects from two-dimensional (2D) images.Earlier approaches treated it as a 2D pattern recognition problem. As a result, typical pattern classification techniques, which use measured attributes of features.

In the Face Recognition process the input image face recognition systems fully automatic by trickling problem such as localizationof a face in a given image or video clip have been made in the design of classifiers for successful face recognition.

Appearance based holistic approach has Proposed by Kirby and Sirovich in 1990, for Eigen faces has been proposed by Turk and Pentland in 1991 and for Fisherfaces has proposed by Belhumeur et al.in 1997; Etemadand Chellappa 1997; Zhao et al in 1998.

Fisher faces is most widely used for face Recognition which is described by Belhumeur et al [5]. It is based on appearancemethod. In 1930 R.A.Fisher developed Linear or Fisher discriminant analysisfor face recognition.
The Fisher face method used PCA and LDA which produce subspace projection matrix.

Template matching[5] is proposed by Bishel and further proposed by Bruneli&Poggio In Template matching is available for all aspects of developing automatic four template feature i.e eye ,nose ,mouth ,face and selecting the entire set. The system is evaluated by comparing results from geometric based algorithm.

3.PROPOSED METHOD

Our proposed is work on local features instead of holistic feature for partial face recognition. We use SIFT [6] (Scale invariant Feature Transform) to detect local features key points, which are concatenated with SURF.[7]These key points of probe and gallery are matched to each other.

3.1 Feature Extraction

In feature extraction we proposed to use local features.Firstly, we detect key pointsusing SIFT For typical size 128x128. SIFT feature detector provides hundreds of outputs of feature points. The geometric feature of each point is denoted as G to represent its relative position in the image frame. It provide texture feature of key points to concatenate SIFT and SURF. It provide greater robustness against illumination variations.[8]

3.2 Key points Detection

In Key point detection we know hundreds of Key points of facial images are generated. Butsome irrelevantkey points are hamper matching process of key point. So, firstly filter these key points .and after that we applied the Lowe's selection schemefor key points selection, which is compare with the ratio of distance of the closest neighbor to the one of the second closest neighbor.

3.3 scale invariant feature transform

Scale-invariant feature transform (or SIFT) is an algorithm in computer vision to detect and describe local features in images. The algorithm was published by David Lowe in 1999

Applications include object recognition, robotic mapping and navigation, image stitching, 3D modeling, gesture recognition, video tracking,

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individual identification of wildlife and match moving.

The algorithm is patented in the US; the owner is the University of British Columbia

For any object in an image, interesting points on the object can be extracted to provide a "feature description" of the object. This description, extracted from a training image, can then be used to identify the object when attempting to locate the object in a test image containing many other objects. To perform reliable recognition, it is important that the features extracted from the training image be detectable even under changes in image scale, noise and illumination. Such points usually lie on high-contrast regions of the image, such as object edges.

Another important characteristic of these features is that the relative positions between them in the original scene shouldn't change from one image to another. For example, if only the four corners of a door were used as features, they would work regardless of the door's position; but if points in the frame were also used, the recognition would fail if the door is opened or closed. Similarly, features located in articulated or flexible objects would typically not work if any change in their internal geometry happens between two images in the set being processed. However, in practice SIFT detects and uses a much larger number of features from the images, which reduces the contribution of the errors caused by these local variations in the average error of all feature matching errors.

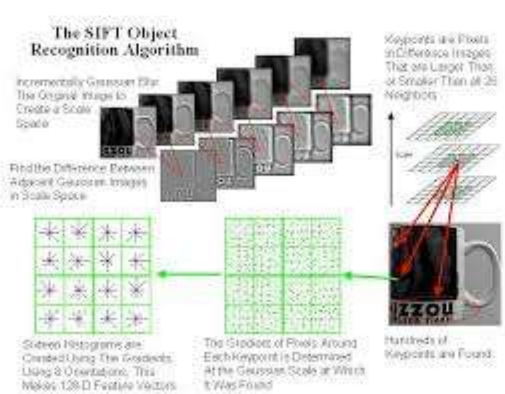


Fig 1:- SIFT object recognition algorithm

SIFTcan robustly identify objects even among clutter and under partial occlusion, because the SIFT feature descriptor is invariant to uniform scaling, orientation, and partially invariant to affine distortion and illumination changes. This section summarizes Lowe's object recognition method and mentions a few competing techniques available for object recognition under clutter and partial occlusion.

SIFT key points of objects are first extracted from a set of reference images and stored in a database. An object is recognized in a new image by individually comparing each feature from the new image to this database and finding candidate matching features based onEuclidean distance of their feature vectors. From the full set of matches, subsets of key points that agree on the object and its location, scale, and orientation in the new image are identified to filter out good matches.

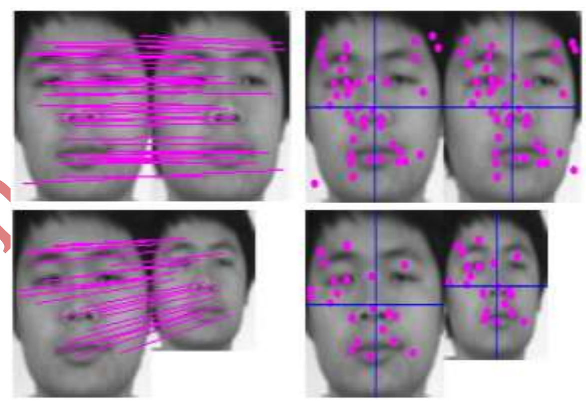
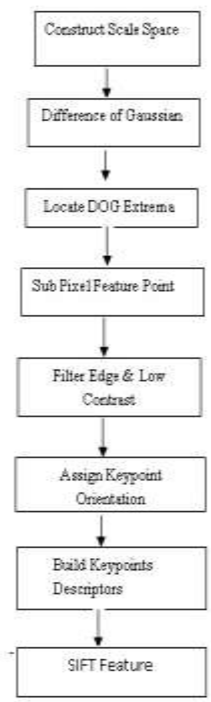


Fig 2:- all point are match with another image

Algorithm: SIFT

1. Take an input image & built DOG space
2. Find out scale invariant feature detection Threshold contrast is to be find out.
3. Now after key points localization assign Orientation.
4. Generate feature matching or indexing.
5. Key point descriptor is to be find.
6. Key point matching is to be done.

3.4 Flowchart



4. CONCLUSION

Face recognition is a challenging problem in the field of image processing and computer vision.Because of lots of application in different fields. The face recognition has received great attention.In this paper, we have proposed a partial face recognition method by using robust feature setmatching. We proposed to SIFT use local features matching key point pairs anda non-affine transformation function.

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