An Effective Model for Heterogeneous Face recognition in a Static Background

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Abstract **- Real time faces images are captured in different spectral bands are referred to as heterogeneous. In this paper, the new approach based on low resolution heterogeneous face recognition and synthesis is proposed. In the recognition section, multi block local binary pattern (MBLBP) is used as facial representation for low resolution images. Then Canonical Correlation Analysis (CCA) is an applied to learn the mapping between the different LBP-face patterns. The corresponding matching scores are calculated in the CCA subspace for the final decision. In the synthesis section, according to the CCA transformation matrices obtained above, we apply ridge regression to determine an approximate linear relation between the target pattern image and the projection vector of the probe. The work shows a practical solution for reliable heterogeneous face synthesis.**

Index Terms **- Adaboost, DoG, Face Recognition, Heterogeneous, MB-LBP.**

I.INTRODUCTION

The heterogeneous face recognition system involves matching of two real time face images from alternate digital image modalities. The two modalities are near infrared image (NIR) and visible light (VIS). There are many difficulties we faced to match the two heterogeneous face due to its versatile properties, such as skin spectra optical properties, dynamic intensity etc. direct appearance-based matching is no longer solution to solve the problem. Hence need to find the best approach to find the face matching with the help of feature extraction. The sketch has been converted into photograph and face matching is performed in the existing system. But this is not the best approach to find it, so the proposed system is used to optimal the previous system by extracting the features of the image and attributes are used to face matching process. There are several advantages in this work. First, correlation learning coupled with discriminate learning has been proposed to deal with patch based face recognition. Second, attribute information has been introduced into the work of heterogeneous face recognition. Third, the experiments have been conducted in this work to analyze the versatility of the proposed scheme. The identification of heterogeneous real time faces are preceded using kernel window at different grey scales which allows to detect the faces at each image order without re-sampling the original digital image.

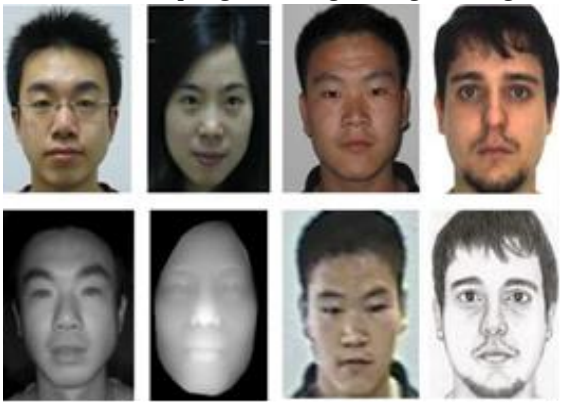

Fig 1: examples of heterogeneous face matching

The real time face recognition applications are fascinated due to its high potential risk in providing security and its law enforcement and also its practical/theoretical challenges. Even though many works are carried out in the static background but performance point of view, this approaches/method is still far from the user satisfactory in terms of accuracy. The quality of the distorted images (probe images) and the reference (gallery) images differs in many

aspects which will lead to poor performance in heterogeneous face matching accuracy, is the main problem in the real time HFR system. The gallery images are always have high resolution images but the probe images usually will have the distorted pixels (blurred images), low contrast images. These factors lead to introduce many challenges for real time face identification/matching for heterogeneous images. The distortion can be due to object in motion, intensity of light variations etc. figure 1 represents the face matching examples in the real time applications. The main aim of the paper is face reorganization from different low resolution sample images by comparing those with single modality original face image using adaboost algorithm for face localization, difference of Gaussians and MBLBP algorithm for feature extraction.

II.PROBLEM STATEMENT

For modern decades, face identification in mono pattern have been developed for VIS and NIR, but the constraint such as enrolment and targeted face images are assumed to be identical. Conversely, most of the times the face images are captured under visible light were intensity of the light is not static in nature. This variation in the intensity of light will degrades the face matching performance. Much research work has been carried out to overcome the problem faced to suppress the dynamic intensity affects also to improve the accuracy of face matching results. One of the approaches is use of NIR technology to suppress the noise and achieve the lightning invariant face recognition to some extent. With the help of NIR images and allow the use of exiting ID face photos as gallery templates, the work will be more accuracy and efficiency.

III.EXISTING SYSTEM

Many research works has been done providing some sort of solution in finding face detection in different application. Most of the method uses sketches and it has been continued into various modalities such as near infrared and forensic sketches. The kernel based approach for classification of the images and also highlight a representative section of studies in heterogeneous face detection is explained in this section. The sketch is synthesized by many algorithms developed to identify the heterogeneous face matching but not led to more accurate. the image transformation have been progressed in performance of the image by discriminative feature extraction based method. the key advantages of the synthesis method is once the sketch is converted in to image format then matching is performed using existing face matching algorithm. The proposed prototype module will strength the accuracy in face matching performance in static background irrespective of the dynamical changes in the intensity of the visible light. The proposed method will not do direct comparison of original image and the targeted image. Number of discriminative features based methods is proposed which will improve the accuracy of the system.

These approaches will first represent the real time face images using two variants such as local binary patterns (LBP) and SIFT descriptors as feature extraction parameters. The authors named KLARE and JAIN proposed the work based on NIR to VIS face recognition/identification with the help of feature extraction descriptors and RS LDA scheme. The result obtained is still not satisfactory; to improve further other researcher presented a new local patch method to perform heterogeneous face matching on the partial NIR digital images. Zhang and his team used coupled information theoretic encoding techniques to extract the features of the image and performed matching process to identify the object between the sketch and digital stored image. The other two authors named Li and Lei applied coupled spectral regression method for NIR images to recognize the objects (face matching). CSR was extended further to kernel level which is similar to prototype representation.

IV. PROPOSED SYSTEM

The detection of real time heterogeneous face images with the help of scanning window and other kernel filters at various grey levels without re- sampling the original image of any order is proposed in this paper. The effective structures of the attributes classifier allow real time implementation of the detector system. The proposed system yields good detection rates with real time face matching and the proposed system can be used further for object detection in dynamic/static environment application.

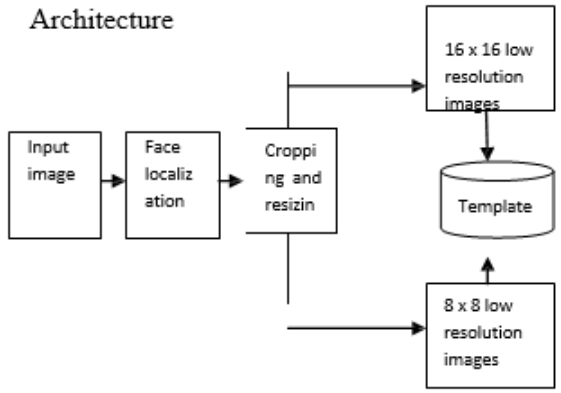

Fig 2: Template generation module

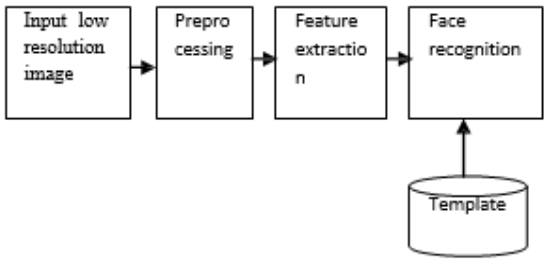

Fig 3: Block diagram of the proposed method

Face Localization:-

The main objective of the face localizations to identify the miniature details of the object resembles attributes extracted from the face for face matching. Many algorithms are proposed to identify the face based on shape, color, object, dynamic background intensity etc. the individual face is highly correlated with many parameters due to lack of variation in the facial/skin complexion. Though the facial attributes differ in color from skin tone, face detection is a difficult task in digital image analysis. The existing methods are subdivided into two methods they are image based methods and feature based methods. In this paper the proposed Adaboost algorithm is used for face localization.

AdaBoost algorithm:-

One of the best efficient boosting algorithm is Adaboost, which consists of simple static ale learners by optimizing the significant training errors. Adaboost requires two streams of inputs, one is as training dataset and set of features (classification functions).prior knowledge about the face structure is not necessary for face matching. The dominant feature of the image will automatically select during training/learning process. The negative and positive test images are tested by current classifiers at every stages of training/learning process. If the test image is misclassified, which means that it is hard to classify i.e. it cannot clearly be assigned in the good class.

Cropping and resizing:-

Cropping is one of the fundamental processes in digital image processing to suppress the outer parts (spreaded/distorted) pixels of the real time image to improve/highlight framing subject matters or statically change aspect ratio. Based on real time application, this process can be implemented on physical captured photograph, artwork of film footage or achieve digital image edited using modern tool/platform. The cropped image then resized in different resolution scales and stored in data base for further use in this proposed method.

Fig 4: cropped face images high resolution to low resolution (left to right)

Feature extraction:

Feature extraction helps in reducing the total amount of data resources used to describe the data accurately. While performing digital image analysis of complex data, the major issues will be concerned based on number of variables involved to describe the attributes of the image.

The feature algorithms are generally classified into three categories. They are based on Feature Extraction, Feature Selection and Feature Classification. The feature is defined as a function of one or more measurements, which identifies some property of an image and is computed such that it computes some significant characteristics of an object.

Image analysis with many attributes/variables for an real time image requires large memory and more computational power also more time to get the result. Many classification algorithms are over fits the training sequence and categories very badly to new sequences. To overcome the problems/disadvantages feature extraction module is used to construct the combinations of the variables to get around these

problems and describe the data with more accuracy. Difference of Gaussian filter algorithm (DoG) and multi block local binary pattern(MBLBP) used in our proposed method.

Difference of Gaussians:

The filters are the building blocks of many real time digital image processing methods. These filters are properly chosen and particular filters are efficiently used to enhance the real time image any different aspects and to extract a specific shape/boundary. The difference of Gaussian filters is a feature enhancement algorithm that involves the difference of the blurred image with the original image (non blurred, original). The values in gray scale are extracted. The input blurred image is convolved with the kernel filter coefficients to obtain the grey scale values having mean, standard deviation of the digital image. High frequency spatial components can be suppressed by using Gaussian kernel filters only. Normal subtraction method retains the spatial information of the targeted object within the allowed range of frequency of the two blurred images. The Gaussian kernel filter works similar to band pass filter that discards the grey values above and below the threshold values and keeps the time domain frequencies that are present in the original image.

Visibility of the image sharp edges and other miniature details present in the digital image are highlighted and enhanced with the help of Gaussian parameters. Enhancement algorithm helps to improve the visibility. Several sharpening filter are also used to enhance the high frequency details but due to presence of high spatial noise component, the sharpening filters also enhance the noise components which will degrades the performance. By identifying the difference of Gaussian parameters, we can remove the high frequency components which includes the noise parameters, rendering this method well suitable for processing images with high degree of noise. This algorithm/method is an inherent reduction in overall image contrast produced by operation.

Multi Block Local Binary Pattern:-

Multi block local binary pattern is new set of distinctive rectangular features are used for heterogeneous face detection. This pattern is used to encode the rectangular regions and the resultant binary patterns can be described the diverse local structure of the digital real time image. The boosting based learning method is implemented with the help of multi block local binary pattern to achieve the objective of the face detection.

Canonical correlation analysis:

The Canonical Correlation Analysis (CCA) is applied to learn the mapping between the different LBP-face patterns. The corresponding matching scores are calculated in the CCA subspace for the final decision. In the synthesis section, according to the CCA transformation matrices obtained above, we apply ridge regression to determine an approximate linear relationship between the target pattern image and the projection vector of the probe. Experimental results are provided to evaluate the accuracy of the method. The work shows a practical solution for reliable heterogeneous face synthesis.

V.CONCLUSION

In this paper, using adaboost algorithm for face localization along with DoG algorithm, MBLBP for feature detection of low resolution image. The purpose of this paper is heterogeneous face recognition from input low resolution images, for this process of recognition canonical correlation analysis is used. There are many database to be used should be made based on the task given (low resolution) .

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