A Review: Face Recognition Techniques for Differentiate Similar Faces and Twin Faces

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Abstract

Facial Recognition Technology is a challenging area in the pattern recognition and computer vision.lot of research is completed in face recognition system. But still we need to enhance the facial recognition system due the poor performance and under practical conditions. This facial recognition technology is used to identify the authorized person mainly for security purpose. In this facial recognition technology its having challenging aspects like similar faces, twins, same person with different ages etc. This paper focus on techniques and algorithm to differentiate the similar faces and identical twins.

I.INTRODUCTION

In computer technology image based on identical twin face recognition technology is challenging task. Traditional facial recognition system exhibit poor performance in differentiating identical twins and similar person under practical conditions. The following methods for differentiate identical twins.

Traditionally lot of manual experiments were performed to identify twins and also to recognize their features with difference, and many more systems were existed to show differences in twins by using finger prints, voice and iris as part of pattern recognition. In existing methods many techniques are used for twin's identification like finger print, voice and iris recognition. The process of finger print identification is used to identify unique person in industry or organizations . The method propose a scan image taken from the person and compare with database for identification. The iris recognition also similar method to finger prints identification.

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A.FACIAL RECOGNITION TECHNOLOGY:

Facial Recognition technology s biometric identification by scanning a human face and matching with stored database images. Face recognition system can be used for identification and verification of a person.

B. EYES RECOGNITION SYSTEM:

Eyes are local feature in the face. The structure of eye is unique for everyone. Iris biometrics systems exploit textural details on the iris than have been shown to be independent even between irises of genetically identical individuals. Automated iris biometrics systems can distinguish between identical twins.

C. VOICE RECOGNITION TECHNOLOGY:

Voice Recognition technology use both physical and behavior based traits to identify individuals. The physical properties of speech are determined by the shape of the mouth and the length and quality of the vocal chords, while the behavioral aspects of speech include pitch, volume as well as conversational mannerism.

Each person have unique iris so we can identify a person through iris recognition system. The process of voice recognition is based on unique person voice matching and identifies the correct person. Finger print recognition has more drawbacks of slow processing and easy to hack. Iris recognition system also has drawbacks such as mismatching due to identification, long time taken for identification and if we have some faults in eye then iris recognition system is not suitable for identification. In voice recognition have disadvantages like, easily miss used by another person.

II.PROPOSED SYSTEM

A.DIFFERENTIATING IDENTICAL TWINS USING GABOR FILTER

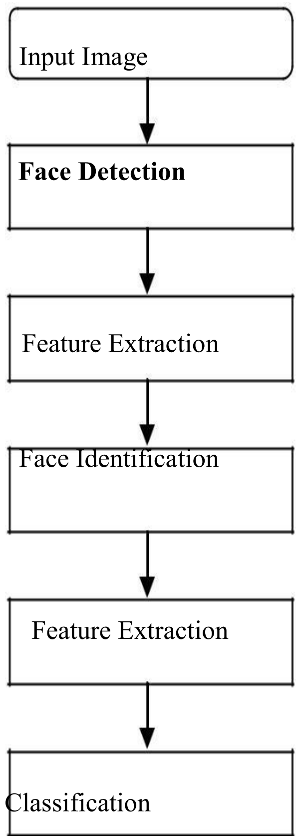

Figure 1: System Architecture

Algorithm:

Different types of filtering and classification algorithms are used for differentiating identical twins.

Gabor Filter

In image processing, a Gabor filter is a linear filter used for edge detection. Gabor filters are band pass filters which are used in computer vision and image processing for feature extraction, texture analysis, and stereo disparity estimation. The impulse response of these filters is created by multiplying a Gaussian envelope function with a complex oscillation. Gabor filter shows that these elementary functions minimize the space (time)-uncertainty product. By extending these functions to 2 dimensions it is possible to create filters which are selective for orientation. Under the practical conditions the phase of the response of Gabor filters is approximately linear. This property is exploited by stereo approaches which use the phase-difference of the left and right filter responses to estimate the disparity in the stereo images. It was shown by many researchers that the profile of simple-cell receptive fields in the mammalian cortex can by described by oriented two-dimensional Gabor functions.

The principal motivation to use of Gabor filters is biological relevance that the receptive field profiles of neurons in the primary visual cortex of mammals are oriented and have characteristic spatial frequencies. Gabor filters can exploit salient visual properties such as spatial localization, orientation selectivity, and spatial frequency characteristics

Algorithm
Pre-Processing

Each face image is edited in 10 different ways and each no face image is edited in 4 different ways.

Feature Extraction

For extracting features apply 2D Fast Fourier transform in all edited face and non-face image, and also in all Gabor filter. After that calculate Ok (z) using convolution between face and non-face images

Training

This is to assign the desired output -0.9 to non-face feature vector and 0.9 to face feature vector these will be the network desired output, face and non-face feature as the input of network.

Testing of Face Detection

Detecting all the face as much as possible in immediate time. So, first our RGB test image should be converted into grayscale level and after that finding region in the test image where the possibility of getting a face is high

Check the surrounding three pixels and cut the image of 27X18 as consider its centre and do as Training. If output greater than 0.95 set all 27X18 pixel to normal one.

If output greater than 0.5 than in image set there corresponding pixel to 1. Repeat the process until all yellow pixels will not be normal.

B.DIFFERENTIATING IDENTICAL TWINS USING FACIAL ASPECTS

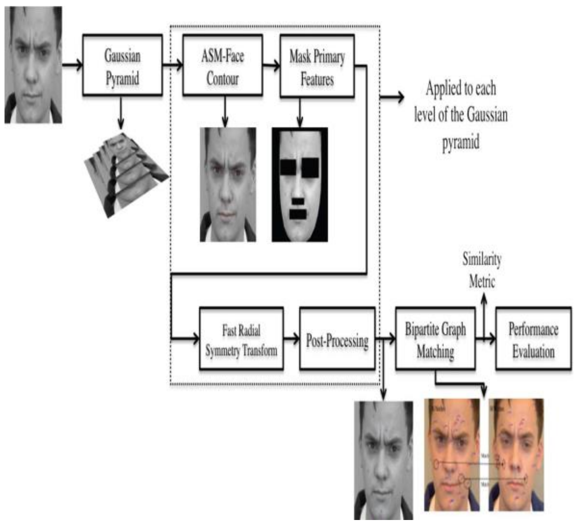

Fig.2.Overview of the proposed multi-scale automatic facial mark detection process.

A. Gaussian Pyramid Construction

The objective is to detect facial marks that are stable across different scales. This can be achieved by using a Gaussian pyramid. The Gaussian pyramid consists of a set of low-pass filtered and subsampled images. The original image is defined at the base level. The successive levels of the pyramid are obtained by filtering the image in the previous level and downsampling it by a factor 2. Gaussian pyramid [22] is defined by

$$G_0(x, y) = I(x, y) \text{ for } l = 0$$

$$G_l(x, y) = \sum_{m=-2}^{2} \sum_{n=-2}^{2} w(m, n) G_{l-1}(2x + m, 2y + $$

where is the base image of size N x N and G(x,y) represents the images in the subsequent levels, l is the level number and is a w(mn) Gaussian filter of size 5x5. The number of levels in a Gaussian pyramid is defined by l=|log N|.In this study we define l=5 . Facial marks are detected at each level and then tracked across levels to signify their prominence.

B. Detection of Primary Facial Features

The contours of primary facial features like eyes, eyebrows, nostrils and lips are detected using an Active Shape Model. Primary facial features must be masked before the detection process to avoid detections that are caused by their presence The Active Shape Model was first presented by Cootes *et a* [10]. Once an ASM is trained based on the data found in the training set, it iteratively deforms a contour to fit the new image. The ASM defines two components of an object, the model shape and the profile. Model shape defines the shape of the contour. The profile is defined

for each contour point and describes what the image looks like around each point in the model. We use an open source implementation of ASM called STASM [20]. This detects 68 facial landmark points corresponding to the contours of the primary facial features. Using these landmark points, a mask is created for each image to mask out the primary facial features referred to as masked images.

C. Fast Radial Symmetry Detector

A color progression based interest operator (the fast radial symmetry transform) is applied to the masked image. The transform detects regions of high radial symmetry. Applying a threshold to the output of the fast radial symmetry transform result in detecting bright or dark regions of high radial symmetry, which corresponds to potential facial marks.

D. Bipartite graph matching:

The process for matching facial marks detected by the multi-scale automatic facial mark detector is similar.In the case of automatically detected facial marks, each facial mark is characterized only by its geometric location on the corresponding face image. Therefore, automatically detected facial marks are treated as point features and can be viewed as they all belong to the same category. The similarity in the distribution of facial marks is used to determine the similarity between two face images. The similarity is computed by formulating a bipartite graph matching problem.

CONCLUSION:

Conclusion of this paper to identify the twins and similar faces using Gabor filter and Multi-scale Fast Radial symmetry transform. Gabor filter is used to differentiate when faces are not similar. But multi-scale Fast Radial Symmetry Transform technique is used to differentiating identical twins and similar faces using facial aspects. This method gives good performance compare than Gabor filter method.

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