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Identification and Classification of Twin Images Using Gabor Filtering Methods

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Abstract: Biometrics and facial recognition are based on the assumption that every individual has a unique identity that is distinguishable from that of others. Algorithms are designed to differentiate an image of one person from an image of another person or to confirm if the two images are of the same person. Identical twins present a challenging scenario since their facial features are very similar. The primary focus is to assess the performance of current face recognition algorithms on a dataset containing face images of identical twins. While other modalities may be used to differentiate between identical twins; such as fingerprint or iris; face recognition is no obtrusive, may be acquired from a distance, and does not require a fully cooperative subject.
In this paper, the images of twins have been taken and verified whether they are identical or not using Gabor Filtering. The Filter extracts the features from images and matches the features.

Keywords: Classification, Gabor Filter, Feature extraction, Pattern matching, Twins

I. INTRODUCTION

The use of face recognition in forensic applications is becoming more and more common, especially because when other biometric modalities may not be available. Law enforcement and security agencies around the world are using face recognition to detect fraud and to identify unknown individuals depicted in the act of committing crimes, even when fingerprints or DNA may not be left behind. Similarly civil programs, such as driving licensing and passport issuance, use face recognition to detect duplicate applicants because the face has long had social acceptance in identity credentials and because capture equipment is so widely available. When utilizing such biometric tools, however, it is important that misidentifications be avoided to minimize or eliminate the chance of inadvertently implicating an innocent person. The problem of mis-identification of twins with existing algorithms is so great, in fact, that some agencies issuing driver licenses have implemented special procedures to flag potential matches against twins. Further, identical twins represent the worst case scenario for face recognition where two separate subjects have a very similar appearance. Subjects may have very similar appearance if one subject is trying to pose as another subject. It is important to test existing face algorithms on the hardest recognition cases. If the algorithms can perform sufficiently well on the hardest problems, then they will be able to solve the simpler problems as well.

II. PROBLEM DEFINITION

Only recently have researchers started to look at the challenges involved in dealing with the task of distinguishing between identical twins [1], [3]. Developing techniques and systems that improve twin face recognition should also improve generic face recognition systems. Although identical twins represent only 0.5% of the global population [2], failure to correctly identify each twin has led to problems for law enforcement agencies [1].

III. EXISTING SYSTEM

In Existing system there is particular interest in using biometrics to distinguish identical twins. While several algorithms and recognition systems capable of differentiating between a single set of twin siblings have been introduced the only other significant study of biometric recognition of twins. They conducted matching experiments using the face, iris, and fingerprint modes as well as a fusion of these modes. The dataset contained images of 134 subjects (64 pairs of twins and two sets of triplets) collected at the Annual Festival of Beijing Twins Day [1]. They determined it was easier to distinguish identical twins using iris or fingerprint biometrics than using face biometrics. They also concluded for face biometrics the identical twin impostor distribution (i.e. the set of scores for a pair of images of identical twin siblings) was more similar to the match distribution than a general impostor distribution (i.e. the set of scores for pairs of images not containing any identical twin siblings). There has also been work on distinguishing identical twins based on other biometrics including palm print, fingerprint, iris, and speech recognition [2]

IV. PROPOSED SYSTEM

In image processing, a Gabor filter is a linear filter used for edge detection. Gabor filters are band pass filters which are used in 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 show that these elementary functions minimize the space (time)-uncertainty product. By extending these functions to two dimensions it is possible to create filters which are selective for orientation. Under certain 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 several 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 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.

System Architecture

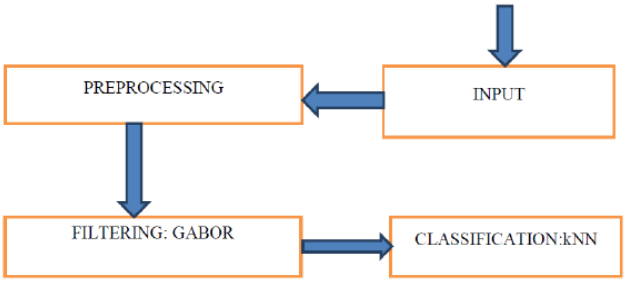


Figure.1: System Architecture

Algorithm

Step 1: Pre-Processing

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

Step 2: Feature Extraction

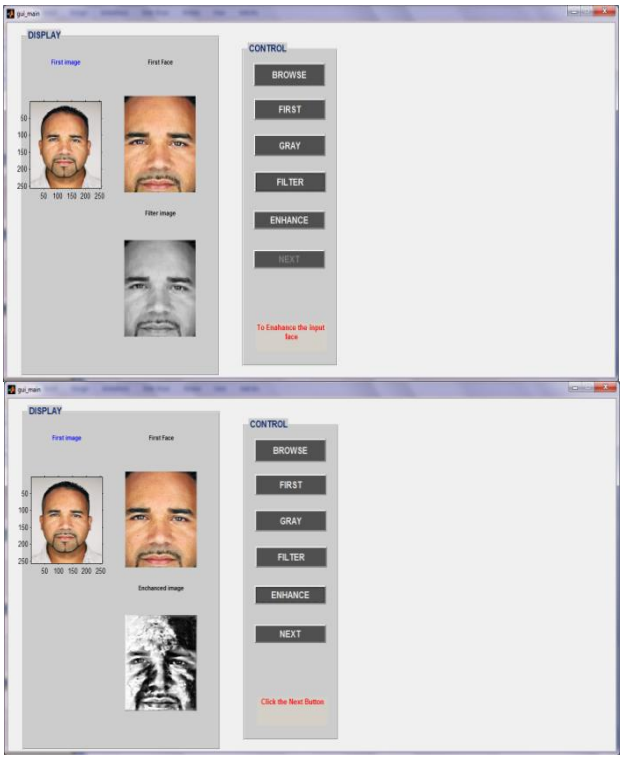
For extracting features apply 2D Fast Fourier transform in all edited face and non-face image, and also in all Gabor filter. After that calculate Ok (z) using convolution between face and non-face images

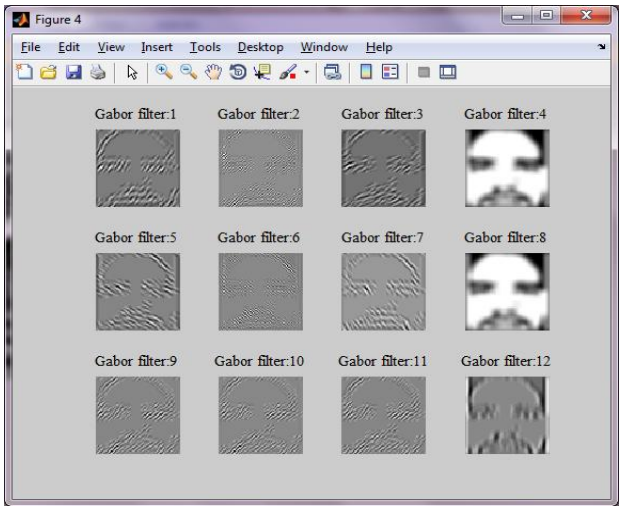
Step 3: Training and classification

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. To Detect all the face, 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

If OUTPUT >0.5 than in image set there corresponding pixel to 1. Repeat STEP 1 to STEP 6 until all yellow pixels will not be normal.

V. EXPERIMENTAL RESULT





The experimentation has been implemented in Matlab. And the performance is been put up in the table.

Classifier	**GABOR Performance**
SVM Classifier	84.41%
kNN Classifier	89.14%
Distance Based Classification	79.99%
Multi SVM Classifier	81.00%

VI. CONCLUSION

The proposed system identified or verified the person based on digital image from unique face humans. The Gabor Algorithms is taken together and proposed the algorithm that produces the accuracy of classification better than the algorithms used individually. The performance of the process is measured and analyzed. The algorithm identifies the identical twins and non identical twins and same person images efficiently. The results show that the proposed system performs satisfactorily in classifying identical twins and non identical twins with high accuracy than the existing algorithms.

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