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A Review: To develop Asian & Non-Asian iris image optimum classifier using artificial intelligence techniques

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Abstract: Analysis of iris pattern has been the focused of researches, mostly in biometric authentication. The researchers state that the iris contains unique patterns to each person and stable with age. Therefore, iris has been used as recognition of a person. Iris recognition is one of the most reliable methods for identification of individuals. However, there are manyparameters which can attenuate the accuracy and reliability of iris recognition systems. The iris recognition system's reliability can be challenged and the accuracy of biometrics recognition systems can be degraded due to the several different abnormalities in the pattern of iris tissue. The main purpose of this proposed work is to find appearance primitives of iris images firstly, compact and yet discriminative visual features, we call them Iris-textons here, are automatically learned from a set of training images. main purpose of this propose work images are classified into two ethnic categories, Asian and non-Asian human iris images.This Purposed work purposes the tasks of extracting, classifying and segmenting the Asian and non-Asian iris images using a more efficient supervised learning approaches for more accurate and computationally efficient segmentation. Classification of Asian and non-Asian iris images is an essential research topic as it may be advantageous in monitoring biometric authentication. Therefore the need for fast, automatic, less expensive and accurate method to classify Asian and non-Asian iris images is of great realistic significance. *IndexTerms* - MatLab, Nuero Solution Software, Microsoft excel, Various Transform Technique.

I. INTRODUCTION

Iris biometrics offers high accuracy in applications such as secure access to bank accounts at ATM machines, national border controls, and secure access to buildings and passports control etc. Biometric methodology both, physical characteristics category contains iris, fingerprints, retina, hand geometry, and face characteristics and behavioural characteristics include voice, online signature, gait and keystroke pattern - is very convenient in comparison with pins, passwords and other tokens. Iris recognition is one of the most reliable methods for identification of individuals. However, there are many parameters which can attenuate the accuracy and reliability of iris recognition systems. Identifying or verifying one's identity using biometrics is attracting considerable attention in these years. Biometrics authentication uses information specific to a person, such as a fingerprint, face, utterance, or iris pattern. Therefore, it is more convenient and securer than the traditional authentication methods. Among all the biometrics authentication methods, iris recognition appears to be a very attracting method because of its high recognition rate.

The iris of human eye is the annular part between the black pupil and the white sclera, in which texture is extremely rich. Some examples are shown in Fig. 1. Iris texture is random and unique to each subject, so iris recognition has become one of the most important biometric solutions for personal identification. Since Daugman's first iris recognition algorithm, there have been many schemes for iris representation and matching in literature. All these method regard iris texture as phenotypic feature. That is to say, the iris texture is the result of the developmental process and is not dictated by genetics. Even the genetically identical irises, the right and left pair from any given person have different visual appearance. However, through investigating a large number of iris images of different races, Asian and non-Asian, we found that these iris patterns have different visual appearance. Fig. 1 shows some typical iris examples, the first column is from Asian, and the second column is from non-Asian. These images have very different visual appearance. For an iris image from Asian, the inner 1/2 annular part of iris region often provides more texture information than the outer 1/2 annular part and the main patterns are spots and blocks.

However for an iris image from non-Asian, the above two parts provide almost the same texture information and the main patterns are capillary like patterns. We have an intuitive assumption that the iris patterns are both a phenotypic feature and a genotypic feature. Iris texture of different race is consisted of different appearance primitives. Motivated by this assumption, we try to find out the differences of visual appearance in different ethnicity and do ethnic classification (also called race classification) based on iris texture.

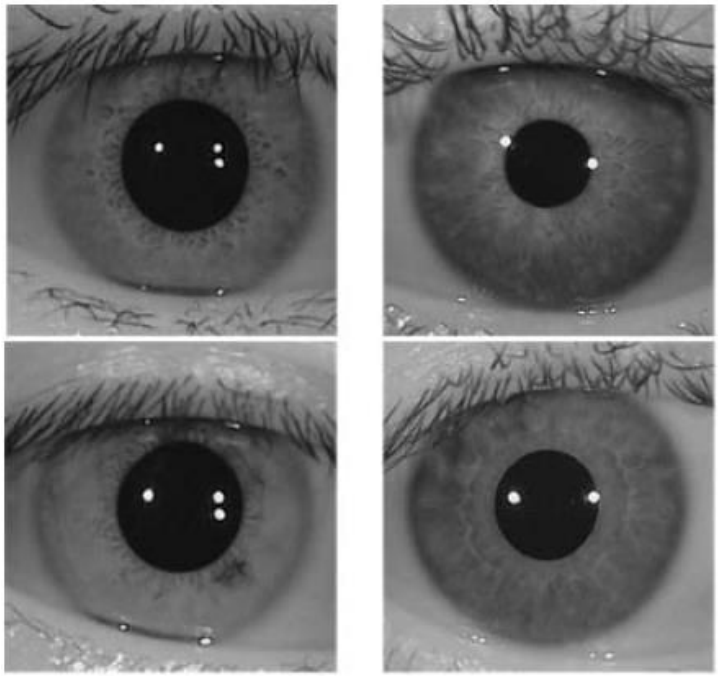

Fig. 1. Examples of iris images. The first column is from Asian, the second column is from non-Asian.

In this chosen work, we propose a novel algorithm for automatic ethnic classification based on discriminative appearance primitives of iris images. The main purpose of this purpose work is to find compact and yet discriminative visual features, we call them Iris-Textons here, are automatically learned from a set of training images. Then the Iris-Texton histogram was used to represent the visual appearance of iris images. Finally, all images are classified into two ethnic categories, Asian and non-Asian, through neural networks. This work is expected to be used for coarse classification in an iris recognition system. It will speed up iris matching on a very large scale iris database, which includes a lot of Asian and non-Asian users.

II. LITERATURE REVIEW

P. Radu, K. Sirlantzis, W.G.J. Howells, S. Hoque, F. Deravi proposed a work on iris recognition technique. In this work 2D Gabor filter is used for feature extraction and optimizing techniques, since it provides the analysis of the image similar to human visual cortex. This work was carried out for UBIRISv1 database. This method is suitable for both near infrared and visible spectrum iris images.

Sushilkumar S. Salve and S. P. Narote proposed a work on iris recognition method based on SVM and ANN classifiers. Here Canny edge detection and Hough transform are used in pre-processing stage. 1D Log Gabor wavelet is used for feature extraction. Then ANN and SVM are used for the classification. This work was carried out using CASIA4 database.

From the related work reported so far in the published literature, it is observed that some of the researchers employed neural network, SVM for iris image identification and classification are as follow.

Ahmad Nazri Ali.“Simple Features Generation Method for SVM based Iris Classification”. Penang, Malaysia,29 Nov-1Dec 2013.

This paper suggests an approach to enhance the image in order to obtain abundant iris texture. First, using common method ofsegmentation, the iris region is localized and transformed torectangular form. Then, we apply the moving average on theimage to reduce random noise. At this stage, an amendment willbe imposed to produce uniform gray levels distribution. After that, histogram equalization method will be applied to produce equalized contrast and more embellish iris pattern. Finally, thisenhanced image is used to produce one dimensional real value as iris signature. Support Vector Machines (SVM) is used to classify the iris images and the results are promising.

Joke A. Badejo, Aderemi A. Atayero, Ota, Nigeria& Tunji S. Ibiyemi, Ilorin, Nigeria, “A Robust Preprocessing Algorithm for Iris Segmentation from Low Contrast Eye Images”, 6-7 Dec 2016.

This paper proposes an image pre-processing algorithm forrobust iris segmentation of low contrast images, aimed atreducing mis-localization errors of basic curve-fitting algorithms.Similar to face detection, the algorithm performs iris detectionwith a k-NN classifier trained with features extracted by arotation-invariant texture descriptor based on the co-occurrenceof local binary patterns. The integration of the proposedalgorithm into an existing open-source iris segmentation moduleoffered a 40% improvement in execution time; a segmentationaccuracy of 92% was also recorded over 1,898 low contrast eyeimages acquired from African subjects. The low contrast eyeimages were acquired to support diversity in iris recognition.

Atul Bansal, Mathura, India & Ravinder Agarwal, R.K. Sharma, Patiala, India, “SVM Based Gender Classification Using Iris Images” 2012.

In this paper gender has been identified using iris images. Statistical features and texture features usingwavelets have been extracted from iris images. A classification model based on Support Vector Machine (SVM) has been developed to classify gender and an accuracy of 83.06% has been achieved in this work.

Dharanesh C M, Ragvendra Prasad & Chandrashekar M Patil, VVCE, Mysore, “ Feature Extraction & Classification for PersonalIdentification using Iris ,2017.

This paper presents a new approach for feature extraction of iris image for recognition purpose. Two methods are used in this work for feature extraction and classification. Firstly input image is pre-processed where iris region and pupil region are extracted from the eye image using canny edge detection and Hough Transform. Then key features are extracted from the iris region and using these features classification is performed for iris recognition. Combination of three feature extraction algorithms and a classifier is used in each method. The combination of Gabor filter, Principally Rotated complex wavelet filter (PR-CWF), Discrete Wavelet Transform (DWT) and Support Vector Machine (SVM) is used as method1. Similarly combination of PR-CWF, Bayer's Nearest Neighbor (BNN), Fast Fourier Transform and Artificial Neural Network (ANN) is used as method2.

YONG LU AND HAICHUAN PAN, Beijing 100081, China. "Application of Iris Images in Racial Classifications Based on Dilate Convolution and Residual Network, 29 Nov,2019.

The existing method of racial classificationby iris image mainly adopts manual extraction of features and classification research, which has certainlimitations. We proposed a method based on improved residual network for iris image race classification. Inorder to more fully extract the iris image features, we divide the network into two parts. We take apart in the first part of the network to the channel, for each channel for unused convolution kernels is utilized to extractfeatures, and then connect the second part the back-end network residual, need special pointed out that inorder to increase the receptive field. We use dilate convolution in each convolution layer, and we also useCAIAS and UBIRIS public data sets to verify the effectiveness of our method, the classification accuracy is96.71%, and F1-score is 0.97.

Renu Sharma, Ashutosh Singh, Akanksha Joshi, Abhishek Gangwar, Mumbai, India, "Robust Iris Classification through a Combination of Kernel Discriminant Analysis and Parzen Based Probabilistic Neural Networks" 2014.

Iris template classification in unconstrained environment is one of the open challenges in recognizing human through iris biometric modality. The iris template classifier must be robust to the outliers and noise introduced in the individual iris class distribution because of the occlusion, blur, specular reflection, etc. Also, it should perform fast enough, to make its use in realworld applications. We are introducing a combination of featurereduction technique called kernel discriminant analysis and parzen-based probabilistic neural network classifier which shows robustness to the outliers and noises and gives great advantage intime complexity as compare to other state-of-the-art classifiers. Comparisons are presented with the state-of-the-art classifiers like Euclidean distance, hamming distance with mask template, support vector machine, and sparse representation based classifier on two publicly available iris databases: CASIA-Iris-Thousand andCASIA-Iris-Lamp.

Dinesh Kumar Vishwakarma, Divyansh Jain, Shantanu Rajora, Delhi, India, "IRIS DETECTION AND RECOGNITION USING 2 FOLD TECHNIQUES", 2017.

The objective of this paper is to introduce a new integrated methodology for iris detection and recognition usinga twofold method to deduce better results as compared to the existing techniques. The methodology primarily employs the Finite Impulse Response(FIR) and Gabor wavelet transform as for computing fundamentals. The figurative classification in the proposed algorithm is on the basis of euclidean distance. Thus the proposed algorithm solely works on construing the Euclidean distances of the test sample with respect to that of the samples in the data set in the either fold procedures. Further the least euclidean distance measured is considered as the perfect match for the input test sample. As a result of extensive testing and implementation of the proposed algorithm/methodology in this paper, satisfactory accuracy and results are obtained as testedon Self Generated Dataset. The proposed algorithm focus on extensively using all the data available and retrievable from the human iris, specifically the red, green and blue segments, i.e RGB scheme unlike traditional iris based recognition wiz. Computation on grayscale inputs, thus on the contrary, the methodology presented in this paper employs suitable color coding pattern using FIR(Finite Impulse Response) in addition to the Gaborfilter texture classification technique.

Caiyong Wang, Jawad Muhammad, Yunlong Wang, Zhaofeng He, and Zhenan Sun, "Towards Complete and Accurate Iris Segmentation Using Deep Multi-Task Attention Network for Non-Cooperative Iris Recognition, 2020.

this

Paper proposes a high-efficiency deep learning based iris segmentation approach, named *IrisParseNet*. Different from many previous CNN-based iris segmentation methods, which only focus on predicting accurate iris masks by following popular semantic segmentation frameworks, the proposed approach is a complete iris segmentation solution, i.e., iris mask and parameterized inner and outer iris boundaries are jointly achieved by actively modeling them into a unified multi-task network. Moreover, an elaborately designed attention module is incorporated into it to improve the segmentation performance. To train and evaluate theproposed approach, we manually label three representative and challenging iris databases, i.e., CASIA.v4-distance, UBIRIS.v2, and MICHE-I, which involve multiple illumination (NIR, VIS) and imaging sensors (long-range and mobile iris cameras), along with various types of noises. Additionally, several unified evaluation protocols are built for fair comparisons. Extensiveexperiments are conducted on these newly annotated databases, and results show that the proposed approach achieves stateof-the-art performance on various benchmarks. Further, as a general drop-in replacement, the proposed iris segmentation method can be used for any iris recognition methodology, and would significantly improve the performance of non-cooperative iris recognition.

I. RESEARCH METHODOLOGY

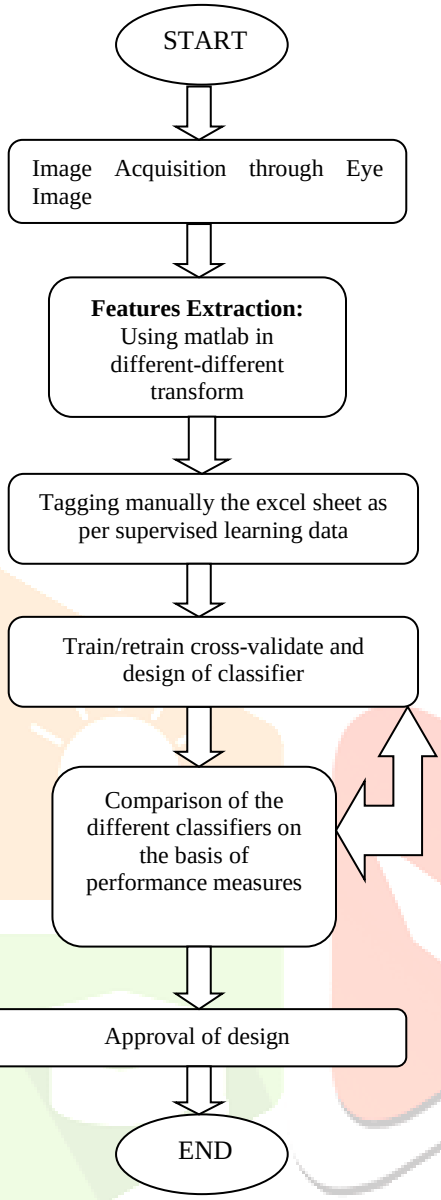

Fig.2 Flow Chart

Computational Intelligence techniques include the following will established techniques.
i) Statistics
ii) Image processing
iii) Learning Machines such as neural network.
iv) Transformed domain techniques such as FFT, DCT, and WHT etc.

For choice of suitable classifier following configuration will be investigated.
i) Principal component analysis.
ii) Support vector machine.
iii) Generalized Feed Forward Neural Network

For each of the architecture, following parameters are verified until the best performance is obtained.
i) Train-CV-Test data
ii) Variable split ratios
iii) Retraining at least five times with different random initialization of the connection weights in every training run.
iv) Possibility different learning algorithms such as Standard Back-Propagation, Conjugate Gradient algorithm, Quick propagation algorithm, Delta Bar Delta algorithm, Momentum
v) Number of hidden layers
vi) Number of processing elements of neurons in each hidden layer.

After regions training & retraining of the classifier, it is cross validated & tested on the basis of the following performance matrix.

i) Mean Square Error
ii) Normalized Mean Square Error
iii) Classification accuracy
iv) Sensitivity
v) Specificity.

In order to carry out the proposed research work, Platforms/Software's such as Matlab, Neuro solutions, Microsoft Excel will be used.

IV.RESERCH OBJECTIVES:

i)To maintain the correctness & accuracy in the classifying iris images even though the input images are contaminated by known or unknown noise.
ii) To increase the classification accuracy for the identify Asian and non Asian iris images.

V. CONCLUSION

This paper demonstrated howartificial neural networks(ANN)could be used to build accurate Asian & Non-AsianIris image classifier and I am also try to achieved result more accurate and reliable.

VI. ACKNOWLEDGMENT

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