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SVM based Iris Classification

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Abstract: In the modern computer era, the greatest importance is given to the individuals to secure and verify. Among all other Biometric, Iris recognition is one of the best methods to provide distinctive verification for each person based on the structure of the iris. Support Vector Machines (SVMs) are generally known as an efficient supervised learning model for taxonomy problems. The success of an SVM classifier depends on its parameters as well as the structure of the data. In this paper, we present the various uses of SVM based iris classifications.

Keywords: Support Vector Machines (SVMs), parameters, iris classifications, verification

I. INTRODUCTION

The biometrics can be utilized in centralized, state and nearby governments, in the military and commercial applications, Enterprise-wide organize security frameworks, government IDs, secure electronic keeping money, contributing and other money-related exchanges, retail deals, the law requires, and health and social administrations are profited by utilizing these advances. The application which comes with Biometric-based verification is the workstation, arrange, and space gets to, information security, exchange security, and Web security.

Utilizing the biometrics for individual verification has become convenient and more exact than the arrangement of passwords or PINs. Biometrics gives an interface to a watchword or token utilized by somebody other than the authorized client and to it can give a review path to get to be socially satisfactory and economical.[1][2][3]

II. IRIS IDENTIFICATION

Iris identification works on the origin of iris pattern in the human eye. The iris is the pigmented elastic tissue that has an adjustable circular opening in the center. It controls the diameter of the pupil. In adult humans, the texture of the iris is stable during their lives. The iris patterns of left and right eyes are different. The iris patterns and colors change from person to person.

There are four steps a biometric system takes to perform recognition and authentication:

1. Acquire a live sample from the candidate by using sensors.

2. Extract prominent features of the sample by using processing unit

3. Compare live sample with samples stored in the database by using algorithms

4. Present the decision like Accept or reject the candidate.

The biometric sample is acquired from applicant user. The well-known features are extracted from the sample and it is then compared with all the samples stored in the database. The biometric system allows the person to access the resources when the input matches with one of the samples in the database otherwise prohibit.[4][5][6]

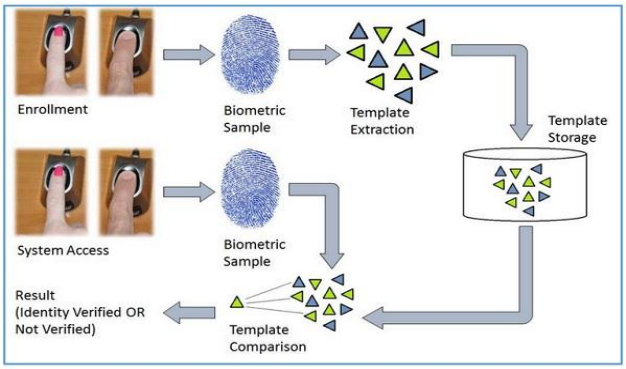

Figure 1. Block diagram of a general Biometric recognition system.

III. LITERATURE REVIEW

A. Simple features generation method for SVM based iris classification

To enhance the image in order to obtain abundant iris texture, Simple feature generation method for SVM based iris classification was used. The first method of segmentation was localized and transformed the iris region into a rectangular form. Then, they apply the moving average on the image to reduce random noise. To produce uniform gray level distribution, an alteration should be done at this stage. Next, they have applied histogram equalization method to produce equalized contrast and more exaggerate iris pattern. Finally, this enhanced image was used to produce one-dimensional real value as iris signature. Support Vector Machines (SVM) were used to classify the iris images and the results are promising.[11]

B. Improved Normalization Approach for Iris Image Classification Using SVM

In this entitled paper "Improved Normalization Approach for Iris Image Classification Using SVM", they proposed a low complex, simpler and improved version of the rubber sheet model. This method was used to minimize the complex computations that were involved in the conventional rubber sheet model and to provide an equivalent performing approach with very fewer computations. Finally, CASIA and IIT Delhi IRIS databases using SVM classifier were evaluated on Classification performance.[12]

C. Recognition of Image-Orientation-Based Iris Spoofing

This paper presented a solution to automatically recognize the correct left/right and upright/upside-down orientation of iris images. This solution can be used to counter spoofing attacks directed to generate fake identities by rotating an iris image or the iris sensor during the acquisition. Two approaches are compared with the same data, using the same evaluation protocol: 1) feature engineering, using handcrafted features classified by a support vector machine (SVM) and 2) feature learning, using data-driven features learned and classified by a convolutional neural network (CNN).

A data set of 20 750 iris images, acquired for 103 subjects using four sensors, was used for development. An additional subject-disjoint data set of 1,939 images, from 32 additional subjects, was used for testing purposes. Both same-sensor and cross-sensor tests were carried out to investigate how the classification approaches generalize to unknown hardware. The SVM-based approach achieved an average correct classification rate above 95% (89%) for recognition of left/right (upright/upside-down) orientation when tested on a subject-disjoint data and camera-disjoint data, and 99% (97%) if the images were acquired by the same sensor. The CNN-based approach performed better for same-sensor experiments, and presented slightly worse generalization capabilities to unknown sensors when compared with the SVM.[8]

D. Contact lens detection for iris spoofing countermeasure

In order to handle the spoofing attempts, its detection was an inevitable part of a recognition system, to reduce the risk of forging system. The Cosmetic contact lens is one of most common spoofing materials which is hard to be detected. In this ponder, weighted local binary pattern (w-LBP) and simplified scale invariant feature transform (SIFT) descriptors were utilized to extricate the include of the iris, was segmented using gradient magnitude and Fourier descriptor. Simplified SIFT descriptor was extricated at each pixel of iris picture and being utilized to rank the nearby local binary pattern (LBP) sequence of encoding. The highlights were at that point displayed to support vector machine (SVM) classifier, for positive vs. negative classification. Positive class implies that contact focal point was utilized by an individual, and vice versa. The test comes about appearing that combining SIFT and w-LBP as highlights for SVM yielded a precision of 84%.[9]

E. feature weighting and SVM parameters optimization based on genetic algorithms for classification problems

Support Vector Machines (SVMs) are widely known as an efficient supervised learning model for classification problems. However, the success of an SVM classifier depends on the perfect choice of its parameters as well as the structure of the data. Thus, the aim of this research is to simultaneously optimize the parameters and feature weighting in order to increase the strength of SVMs. They propose a novel hybrid model, the combination of genetic algorithms (GAs) and SVMs, for feature weighting and parameter optimization to solve classification problems efficiently. They called it as the GA-SVM model. Their GA was designed with a special direction-based crossover operator. Experiments were conducted on several real-world datasets using the proposed model and Grid Search, a traditional method of searching optimal parameters. The results showed that the GA-SVM model achieves significant improvement in the performance of classification on all the datasets in comparison with Grid Search. In terms of precision, the method was competitive with a few state-of-Arts. [10]

IV. CONCLUSION

Iris recognition was programmed identification of a person that has been researching interest in recent years. Support Vector Machine is a quickly expanding field with the guarantee for more prominent applicability in all domains of investigating, we trust that we have given an acceptable overview of what is right now happening in this advancing and energetic range of research. Also,the basics of

the support vector machines (SVMs) have been discussed along with the distinctive details of the optimization issue resulting from the training of such machines.

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Authors Profile

R.Subha, M.Sc., graduate from Kodaikanal Christian College, Kodaikanal and M.Phil., graduate from Prist University, Tanjore. Her research work has been published in the National/International/ Journal s and in the conferences. Her research interests are in the area of Biometrics and Computer Networks.She currently serves as the Asst. Professor in the department of Computer Science and information technology, Kodaikanal Christian College, Kodaikanal, India.She is doing Ph.D in Mother Teresa Women's University, Kodaikanal.

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