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IMPLEMENTING IRIS RECOGNITION IN MODERN VOTING: A MACHINE LEARNING FRAMEWORK

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ABSTRACT

Based on the iris recognition system and related technologies, one of the primary outcomes of the validation system is the fingerprint-based system. The whole biometric procedure is much more genuine and distinct than the other kinds of validation procedures and recognition systems. This has given people creative ideas for their everyday lives. In general, the multimodal biometric process has used a variety of applications to appropriately address the most important and relevant shortcomings of the "unimodal biometric system." In general, the complete process has been incorporated, taking into account the appropriate noise sensitivity, population coverage regions, situations of variability involving both intra- and inter-class concerns, vulnerability involving potential hacking, and non-universality criteria. The machine learning system with a deep learning orientation has been the primary topic of the whole research article. Convolutional neural network (CNN) technology has been primarily used in the fingerprint-based iris recognition system to provide accurate human validation. The iris recognition system has mostly been used in relation to the "high security protection system with actual fingerprints" in the current data validation procedure. The optimal uniqueness, reliability procedure, and appropriate "validity of the iris biometric validation system" for the real goal of person identification have been briefly discussed throughout the whole text.

1. INTRODUCTION

The primary use of biometrics has been the identification of distinct physical characteristics and attributes. For this reason, a vast array of recognition technologies, including voice, iris, and fingerprint processes, have been widely made available. The appropriate technical and technological domains for body controls and body measurements are the primary focus of biometrics. The proper biometric security system, which has grown in significance across all nations, is the foundation of the authentication system. Based on all of these processes and factors, the used system has shown the appropriate, legitimate, and most outstanding performance. The fingerprint is the sole method that offers the appropriate security measures to ensure the system's complete uniqueness and robust privacy features. The automated techniques and processes to guarantee fingerprint similarity between two individuals have been the major focus of

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outstanding fingerprint assurance, also known as the appropriate kind of imprint approval. The real goal of the basic research, which is ultimately based on the research goals and related research questions, has been presented throughout the whole chapter. The research framework for the whole study is also presented in this chapter. Every element that contributes to this identification process has been outlined by basic research.

2. LITERATURE REVIEW

The literature review chapter primarily offers a thorough explanation of the many issues and components of recognition that have been primarily connected to the complete field of the research study. The many kinds of study notes from various writers and academics have been used to aid in the basic research. The synopsis of the study from the many websites, journals, and online papers is another factor that evaluates the complete procedure. A thorough investigation of the validation-based recognition system as a whole has been the subject of basic research. Along with all of them, this chapter has also shown the specific theories and models related to the suggested subject for assessing the description process as a whole. This section also describes the gaps in the literature that are often absent from the current study notes written by different writers.

A biometric system is one of the safest methods to interact with the digital world, claims author Alrahawe (2018). Biometric methods, such fingerprint, face, and iris identification, are considered safer than other methods for protecting sensitive information since each person's biometrics are unique (Alrahawe, 2018). On the other hand, due to a lack of technology in the past, there was inadequate protection for any sensitive data. Since technology has advanced recently, biometric security has become a crucial component of all systems. Furthermore, the author claims that these security procedures in digitalisation are now error-free, which is why the newest systems are using this method (Singh & Kant, 2021). For security reasons, this is quite dependable despite small system faults. The finger-knuckle recognition method is one of the many recognition techniques that the biometric system has used.

Elhoseny (2018), the author, claims that the identification and verification procedures used a unimodal approach. However, since the unimodal system did not match the appropriate decision-making criteria, the accuracy was not entirely maintained. Elhoseny (2018) discovered that using the unimodal technique for verification resulted in a significant decline in accuracy. The multimodal system was subsequently introduced. Since the multimodal system makes use of fusion technology, the verification's overall correctness was attained. The iris and fingerprint always have the greatest permanence and uniqueness when compared to other modalities. In addition, they are more affordable and have a faster speed in comparison to other modes of transportation.

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The multimodal system handles four distinct jobs, including acquisition, feature extraction from the modalities, matching with the real one, and decision provision, while the unimodal system was not fully included in the notion of decision making (La, 2021). In several situations where a lower level of security might be advantageous, unimodal systems are also used. Multimodal solutions are necessary for industries handling large volumes of sensitive data and for high security reasons.

3. EXISTING SYSTEM

The process of encoding and processing an individual's irises requires a large number of new calculations. When it comes to built frameworks and calculations, almost always only superior is guaranteed. However, neither of the computations has been subjected to extensive testing due to the lack of publicly available large-scale and even medium-size databases. The largest collection of infrared frontal iris images is now available online. Two notable solutions to the calculation testing problem in the lack of data.

- **Disadvantages:**

Errors are probable due to hazy iris images and the fact that segmentation and noise detection are handled in separate processes.

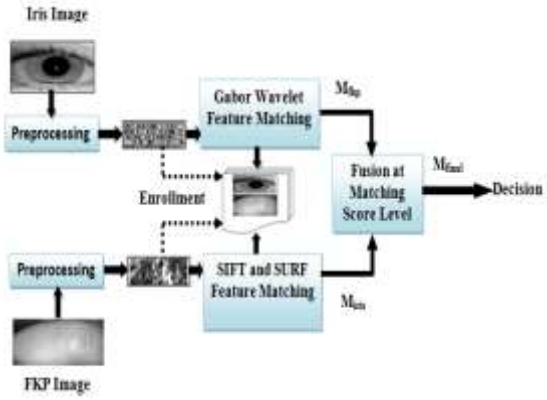
4. PROPOSED SYSTEM

For this project, we are using the CASIA IRIS dataset, which contains photos of 108 people, to train a CNN model that may be used to predict or detect people based on their IRIS. To train a CNN model, we are using the IRIS features extracted from eye pictures by the HoughnCircles technique.

Advantages:

The algorithm has good clustering, as shown by theoretical analysis and comprehensive experimental findings.

SYSTEM ARCHITECTURE



5. ALGORITHIMS

Convolution Neural Network technique (CNN)

The **"convolution neural network (CNN)"** is a specific type of deep learning-based algorithm. This algorithm has been taken as an appropriate input image, an important attribute that is learnable weights with respect to the proper biasing system to the different types of objects. For this purpose, this particular system is very much effective to show the actual difference in the working process in each case. The actual requirement and necessity of preprocessing within the ConvNet are very much lower than the other classifier algorithms (Haytom *et al.*, 2019).

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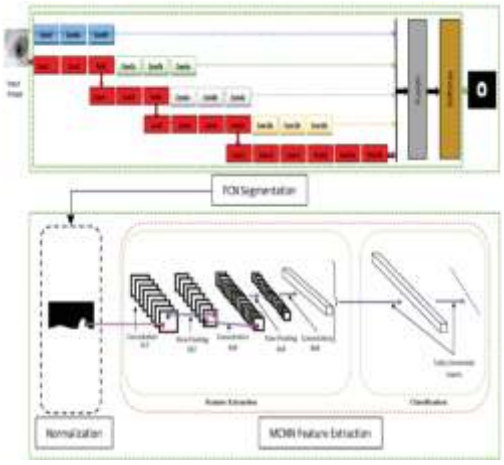
The proper learning strategies and designing components and respective hierarchies of various factors should be done through "convolution neural network (CNN)" with various building structures like pooling layers, convolution layers and entire connected layers. The **"convolution neural network (CNN)"** has been recently provided various types of tasks like the object recognition, object detection, image captioning anf image segmentation. The **"convolution neural network (CNN)"** is the particular types of category that is mainly designed various types of models and methods for completing the entire process such as the respective videos and images that will be very much necessary for completing the entire finger based iris recognition process. This particular network technique is image classification, signal processing and image segmentation. The iris recognition system has been regarded with respect to the "reliable biometric recognition" process during the extraordinary and stable variation within the appropriate texture (Hernández-García *et al.*, 2019). This entire research note has explored the efficient technology and modern techniques which has been mainly used for feature extraction and feature classification. This recognition system is mainly used for enhancing the respective recognition efficiency.



Convolution Neural Network technique (CNN) for Iris recognition system

Normalization process of Convolutional Neural Networking (CNN) model – This particular area has been mainly enclosed by both the outer boundaries and inner boundaries of the iris that will be mainly varied with respect to the contraction of the entire pupil. The extraction of the various features of the **"convolution neural network (CNN)"** is totally based on the classification module. The actual segmentation of the iris recognition system has been generally mapped by the proper region with respect to the fixed and proper dimension. The author proposed an appropriate model, Rubber sheet method for transformation of the different segmentation of iris images within a fixed rectangular area.

6. IMPLEMENTATION MODULES

Upload Iris dataset

This section is for integrating the Iris dataset into the program.

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Preparing the Data

When a dataset is preprocessed with this module, it is ready for further analysis.

Purpose: Feature Extraction

In this step, information is divided into two categories: training data and test data. Data, for instance, might be split into a "training" set and a "test" set with a 70%:30% split.

Synthesis of Models

As for the language used to actualize the strategy, it would be Python. Theano and tensorflow, two Python packages, are very potent for any given deep learning model. Indirectly constructing a model from these libraries, however, is challenging. That's why we utilize Keras and tensorflow as our backend library to make the model as precise as possible. Keras's sequential model includes components referred to as CNN layers. To improve the model's accuracy, these layers perform in-depth processing of the data by analyzing various patterns that emerge in the dataset. In the next step, the data are fed into the selected model to be trained.

Construction of a Convolutional Neural Network Model

Using this component, a CNN Model can be constructed for testing and training purposes.

Graph of Accuracy and Error

By doing so, we may compare the efficiency of different deep learning methods with that of feature extraction algorithms in a graphical format.

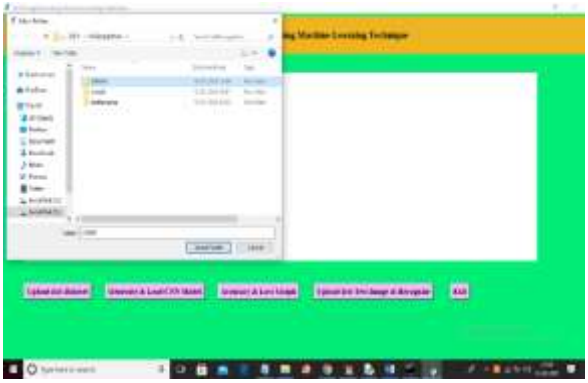
Iris Recognition Test Image Upload

With this feature, users can put an image through its paces by uploading it for testing and subsequent recognition by the software.

7. SCREEN SHOTS

To run project double click on 'run.bat' file to get below screen

In above screen click on 'Upload Iris Dataset' button and upload dataset folder



In above screen selecting and uploading 'CASIA1' folder and then click on 'Select Folder' button to load dataset and to get below screen

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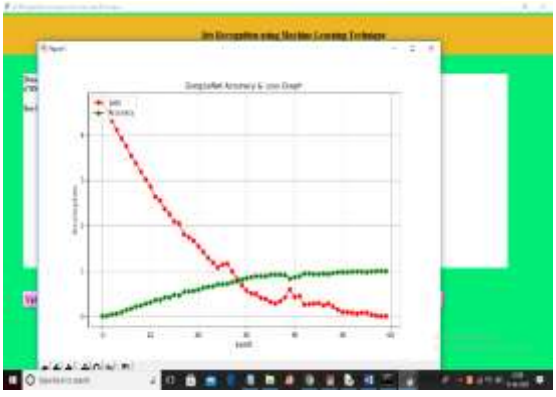
In above screen dataset loaded and now click on 'Generate & Load CNN Model' button to generate CNN model from loaded dataset

In above screen 683 images loaded from different 108 peoples and we got it prediction accuracy as 100%. Now model is ready and now click on 'Accuracy & Loss Graph' button to get below graph



In above graph red line represents CNN model loss value and we can see at first iteration loss was more than 4% and when epoch increases then LOSS value reduce to 0 and green line represents accuracy and at first iteration accuracy was 0% and when epoch/iterations of model increases then accuracy reached to 100% and in above graph x-axis represents EPOCH and y-axis represents accuracy and loss values. Now click on 'Upload Iris Test Image & Recognize' button and upload any test image and then CNN will recognize person ID from that IRIS image. If you want you can upload test image from CASIA folder also and you will see prediction will be 100% correct

In above screen selecting and uploading 'b.jpg' file and then click on 'Open' button to get below screen

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In above screen from uploaded image we extract IRIS features which is displaying in first image and then this image feeds to CNN and then CNN predicted that IRIS belong to person ID 15. Now I will upload one image from CASIA folder and then test whether CNN will predict correctly or not

In above screen from CASIA folder I am uploading IRIS of person ID 38 and then click 'Open' button to get below result

In above screen CNN predicted ID is 38 which is 100% correct

8. CONCLUSION

In this study, a machine learning-based technique for iris detection utilising smartphone images is proposed. The findings above indicate that when machine learning algorithms are applied to iris photographs captured in the visible spectrum using a smartphone, they may be competitive, and in some instances even better than, state-of-the-art technologies. However, accuracy may still be improved. We also discovered that accurate segmentation has a critical role in accuracy. As a result, a number of effective techniques may be used to improve the segmentation result. Our goal was to keep things as simple as possible, therefore we only used accepted methods to distinguish between groups. This was carried out keeping in mind their simple implementation. The modern smartphone's excellent camera quality portends well for the recognition system as a whole, which may be used to security, identity, and recognition. Samsung smartphones already come with a working iris scanner built in. Our next task is to develop a cloud-based server that makes it easier to transmit iris data via a mobile device. A classifier running on the server will compare and validate the data that has been delivered. Because of this, a complete security system may be established with only cellphones.

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