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AI Project Idea

CPE C314 – ARTIFICIAL INTELLIGENCE 2

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Problem Background

Authentication was mostly used by systems to apply security measures; it was mostly done by requiring the input of usernames and passwords. As we rapidly transition into a technological community it becomes a significant issue in system control in computer-based communication. Biometric systems automatically identify people using their unique physical or behavioral characteristics. Considering all of the existing biometrics out there; iris recognition, which scans the unique patterns in a person's iris, is considered the most accurate and reliable biometric identification system available. This study will develop iris detection and recognition to address this problem and utilize image processing algorithms using CNN model to significantly improve image segmentation and iris recognition. This study will investigate the efficiency of using biometric technology to identify a person. Biometric technology is a trending technology used in different fields across the globe. The study proposes a system based on iris recognition technology that can be used to identify a person. The system will be evaluated against a dataset of real human iris images and was collected to be accurate in identifying persons with a high degree of accuracy.

Related Works

IRIENICE is a Korean company that offers different human biometrics systems and devices that can save and compare iris information by converting the iris pattern into frequency values by using the wavelet conversion technology. IRIENICE technology first pixelates the glint part of the original iris image, calculates the average value of the pupil area and finally restores it into a unique iris image. To prevent forge or falsification the company was running a security solution to detect fake iris complying with the ISO standard, they applied forge and falsification prevention technology on iris images, videos and artificial eyes. A big concern with iris technology was the accuracy when a person was wearing eye accessories. But with the use of high-end camera lenses, it was guaranteed that users could conduct iris authentication without any problem even wearing contact lenses, glasses, or a goggle. Capable of authenticating every iris regardless of ethnicity or pupil color. They possess an iris algorithm which underwent tests on various pupils over the world and passed all of those tests. Dang T. V. (2023) proposed a deep learning-based facial recognition approach that is efficient and can be used on mobile devices with limited resources. The approach utilizes an improved FaceNet model based on MobileNetV2 backbone with SSD subsection. The improved architecture uses depth-wise separable convolution to reduce model size and computational volume, while achieving high accuracy and processing speed. This approach is well-suited for identifying people entering and exiting an area, and can be applied to a variety of low-capacity hardware or to optimize system resources. The authors successfully designed a smart automated attendance system using the proposed facial recognition approach. Dr. Ebrahimpour N. (2023) developed MobileNet, a lightweight convolutional neural network (CNN) architecture for image classification and mobile vision. MobileNet requires much less computing power than traditional CNNs, making it ideal for mobile devices, embedded systems, and computers without a GPU. This paper proposes a new iris recognition method that uses MobileNet to extract features from iris images. The extracted feature vectors are then compared to a database of saved feature vectors. If the distance between the two feature vectors is less than a threshold, the person's identity

is confirmed; otherwise, it is rejected. Simulations show that the proposed method is accurate enough for identification and authentication. To locate the iris in a digital image of the human eye, a group of researchers used a combined approach that incorporated both a Polar Spline RANSAC and a Total Variation Model. Once the iris is located, they used Daugman's rubber sheet model and the Gabor filter to extract feature vectors from the iris image. These feature vectors are then compared using the Hamming Distance operator to determine whether the two irises are the same. (Abdul Hasan Z.G., et.al., 2023). A group of researchers have developed a multi-modal biometric system using face and iris recognition, in order to make the system multimodal they use a combination of physical and behavioral characteristics of an authenticated person that they used for training their model. The systems can also use soft biometric features of humans, such as age, height, hair color, eye color, and gender to greatly increase the parameters of the model. While all biometric methods have their limitations, multi-modal biometric systems can improve authentication accuracy and security without sacrificing speed of knowing which person is the correct one that matches with all the human features. (Bagwan S., et.al., 2023).

Project Goals

The main goal of this study is to design and develop a human identification application for data management of personal information. And integrate iris recognition technology as primary identifier to access each person's profile.

Specifically, this study will pursue the following specific goals:

- To modify user profiles by adding, changing, and deleting in the mobile application's database.
- To utilize a phone camera to capture the person's iris which will be processed by the system.
- To apply Convolutional Neural Network Model to extract iris feature points for recognition and identification.

Discussion of the proposed AI model

Ideal Outcome - Correctly identify a person using iris.

Model Goals - Retrieve information of the person that matched with the iris. The researchers would like to build a mobile application, it will serve as the platform for users to register an account wherein they'll need to input all of the necessary information that was asked by the system. At the same time, it will be responsible to transmit the captured iris image by the mobile phone's camera to the system that will process the image for image processing using classification. The researchers believe that classification was the best approach to extract the features of the person's eye and iris. The researchers would use 2 sets of datasets, the first dataset will be coming from the net that will be used to train the AI model in order to increase the accuracy. The second dataset will be gathered

from the class wherein the researchers would capture 20 images of each person's eyes with different angles both from left and right eye. It will be used for the accuracy testing of the system and AI model.

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