HUMAN IDENTIFICATION USING IRIS BY CNN

GUIDE : PROF. S. R. PATIL

GROUP NO.: GA14

GROUP MEMBERS

Name	PRN
Vishal Gorakh Garje	19UCS036
Omkar Ravindra Bhise	19UCS013
Gaurav Nivas Jadhav	19UCS048
Yash Vijay Gare	19UCS035
Rahul Sanjay Bharadia	19UCS012

INDEX

INTRODUCTION

The solution for such problem is really easy. The well known answer is biometrics. It is the science that identifies (or verifies) human on the basis of his measurable traits (e.g., fingerprint, iris, retina, keystroke dynamics). These features can be divided into three main groups—physiological (connected with our body and proper measurements), behavioral (these are the traits that we can learn—e.g., signature) or hybrid that consists of traits that are physiological and behavioral at the same time (e.g., voice). We can conclude that each computer system (with security system based on biometrics) user will not provide any additional passwords because he will be a real password by his measurable traits.

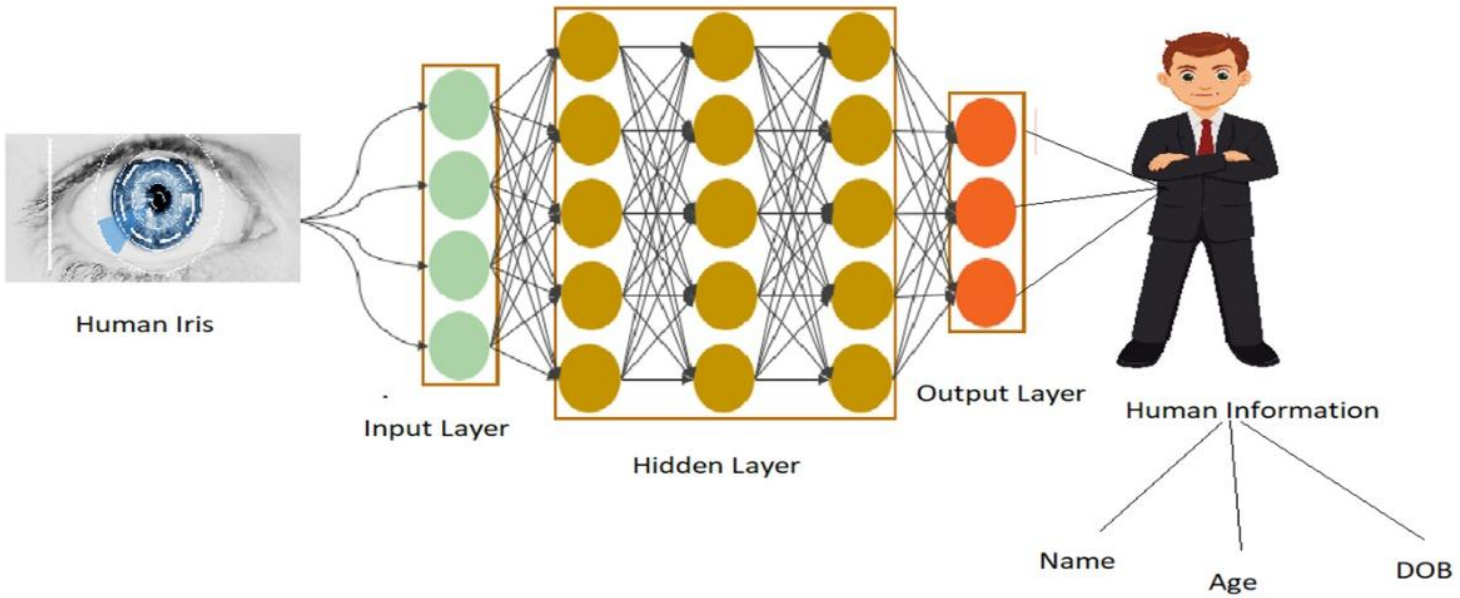
Diversified experiments and research are showing that one of the most important traits that can guarantee high accuracy, efficiency and recognition rate is iris. This feature consists of more than 250 unique elements. Each of them is used to describe human identity (in the form of feature vector). In the literature, it was also proven that such feature vectors are completely different for both eyes of one person (left and right), and moreover it is true, even in the case of twins. Each of them has different irises (feature vectors are completely different). The most important is that iris is really hard to spoof. In the literature, we can find only a couple of research papers that provide some vital evidence that such spoofing procedure was finished with the success.

INTRODUCTION

- Biometrics is related to human unique characteristics. The most promising methods for authenticating a user are biometric systems.
- A biometric recognition device is used to recognize a person under surveillance and access control.
- In this project we are going to detect human by using iris images of particular human for that process we are going to use CNN Algorithm.
- Convolutional Neural Network (CNN) is the class of Deep Learning and it is used for image recognition.
- It has seven types of layers but in our project, we are going to use three layers which are Convolutional Layer, Pooling Layer and Fully Connected Layer.

INTRODUCTION

- convolutional neural network (CNN) has been used to develop a highly accurate iris recognition system.



PROBLEM STATEMENT DESCRIPTION

- As the traditional approaches involve lot of pre-processing, they may not produce the optimum iris recognition model for different iris dataset which are collected under different lightning and environmental conditions.
- Recently, there have been a lot of focus on developing models for jointly learning the features, while doing prediction. CNN is an implicit deep learning-based technique that accommodates the dual objectives.
- Hence, the problem definition is: "**Human Identification using Iris by CNN**".

AIM OF PROJECT

The Aim of project is to build a Machine learning model which help us to identify Human using its iris and to complete this projects we are going to used Convolutional Neural Network(CNN), Hough Transformation Algorithm, Canny Edge Detection Algorithm and Hamming Distance Algorithm.

OBJECTIVES

- The main objective of our application is to identify an individual with high efficiency and accuracy by analyzing the random patterns visible within the iris of an eye.
- To detect human on the basis of iris pattern.
- To build a model which provide us accuracy with less input data.
- To provide model which help to detect human based on human iris.

SCOPE OF PROJECT

- This project involves developing an iris detection system in order to verify the uniqueness of the human iris by detecting the iris pattern from the image.
- The application to be improved is Recognition of Human Iris for Biometric Identification.
- An organization should identify chosen workers to the security system according to document while using their iris on the camera.

LITERATURE REVIEW

S. No	Journal Type with year	Authors	Title	Outcomes
1	2014 22nd International Conference on Pattern Recognition. doi:10.1109/icpr.2014.296	Gupta, P., Behera, S., Vatsa, M., & Singh, R	On Iris Spoofing Using Print Attack	Revisiting iris spoofing with print attack and contact lens combinations, preparing IIITD iris spoofing database consists of over 4800 images from 101 subjects
2	(2020). E103.D(5), 1144–1152. doi:10.1587/transinf.2019edp7276	OUDA, O., CHAOUI, S., & TSUMURA, N.	Security Evaluation of Negative Iris Recognition. IEICE Transactions on Information and Systems,	The negative iris recognition scheme that has recently been proposed to secure iris-codes utilizing the concept of negative database.
3	(2020).. International Journal of System Assurance Engineering and Management. doi:10.1007/s13198-020-00948-1	Arora, S., & Bhatia, M. P. S.	Presentation attack detection for iris recognition using deep learning	we have proposed a deep learning architecture to identify and detect different kinds of spoofing attacks that are possible in an iris recognition system
4	. (2020. Sensors, 20(5), 1308. doi:10.3390/s20051308	Jenadeleh, M., Pedersen, M., & Saupe, D	Blind Quality Assessment of Iris Images Acquired in Visible Light for Biometric Recognition	Based on statistical features of the sign–magnitude transform to estimate the quality of iris images acquired by handheld devices in visible light.

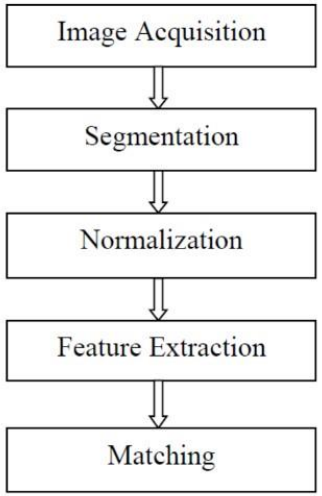
EXISTING METHOD

This model emphasizes an existing method that which is designed using the some of the algorithms of deep learning. Here the process is performed using the ResNet51, which is one of the transfer learning methods, but this could not get the high accuracy.

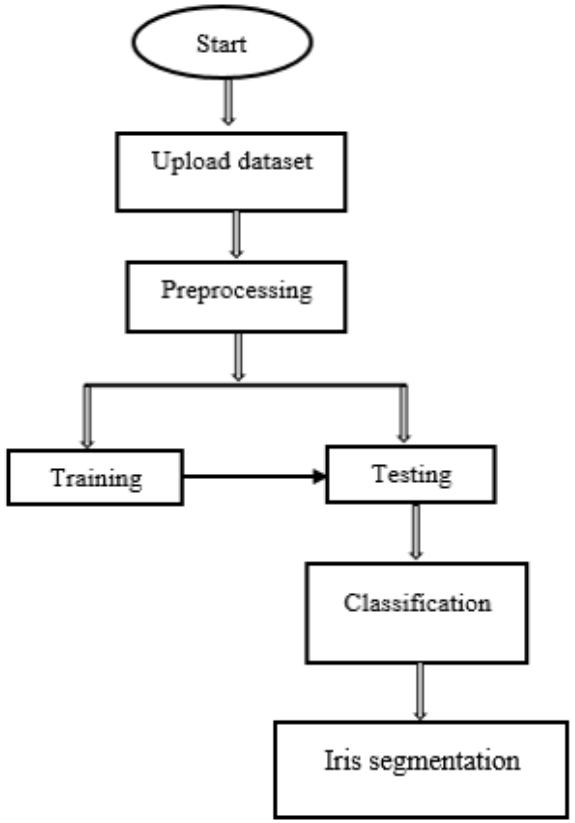
METHODOLOGY

- Our method consists of six steps. The first two include: iris segmentation and normalization, followed by image pre-processing that uses masking and image enhancement.
- The next four steps are performed in a loop assessing the IR performance for features extracted from all the convolutional layers of a CNN.
- the steps are as follows:

    1. Iris Segmentation and Normalization
    2. Image Pre-processing
    3. Feature Extraction
    4. Reducing The Mask Effect
    5. Deducing The ,Mask Effect
    6. encoding And Matching Feature Vectors



PROPOSED METHOD



Block Diagram for Proposed Method

In purposed method we are performing the classification of either the Iris-based Human Identity Recognition identification using Convolution Neural Network (CNN) of deep learning method. As image analysis based approaches for Iris-based human identity recognition. Hence, proper classification is important for the proper nutrition that which will be possible by using our proposed method. Where we are classifying the images using the CNN algorithm. Once after the classification, the iris part is segmented. Block diagram of proposed method is shown below.

ADVANTAGES

- Accurate classification
- Less complexity
- High performance

IMPLEMENTATION

- Firstly, we have collected the dataset of eyes with the 2 classes i.e., right and left.
- Necessary pre-processing steps will be completed with the dataset before training with our algorithm.
- Once after training the model will be saved for testing and classifying.
- User can upload the images of which to be classified and then the iris part of the classified eye is segmented.

MODULES

System

User

1. System:

1.1 Create Dataset:

The dataset containing images of the left and right eyes images are considered that which are to be classified is split into training and testing dataset with the test size of 30-20%.

1.2 Pre-processing:

Resizing and reshaping the images into appropriate format to train our model.

1.3 Training:

Use the pre-processed training dataset is used to train our model using CNN algorithm.

1.4 Classification:

The results of our model is display of classified images either it is left or right eye.

1.5 Segmentation:

Once after the classification the iris part is segmented.

MODULES

2. User:

2.1 View training accuracy:

User can check for the accuracy of the trained algorithm

2.1 Upload Image

The user has to upload an image which needs to be classified.

2.2 View Results

The classified and segmentation image results are viewed by user.

ALGORITHM

CNN:

- In deep learning, a convolutional neural network (CNN, or ConvNet) is a class of deep neural networks, most commonly applied to analyzing visual imagery.
- A convolutional neural network consists of an input layer, hidden layers and an output layer. In any feed-forward neural network, any middle layers are called hidden because their inputs and outputs are masked by the activation function and final convolution. In a convolutional neural network, the hidden layers include layers that perform convolutions. Typically this includes a layer that does multiplication or other dot product, and its activation function is commonly ReLU. This is followed by other convolution layers such as pooling layers, fully connected layers and normalization layers.

HARDWARE AND SOFTWARE REQUIREMENTS

H/W Configuration:

- Processor - i5/Intel Processor
- Hard Disk -160GB
- RAM - 8Gb

S/W Configuration:

- Operating System : Windows 7/8/10 .
- Server side Script : HTML, CSS & JS.
- IDE : PyCharm, Vs code
- Libraries Used : Numpy, IO, OS, Flask, Keras.
- Technology : Python 3.6+.

PROJECT ARCHITECTURE

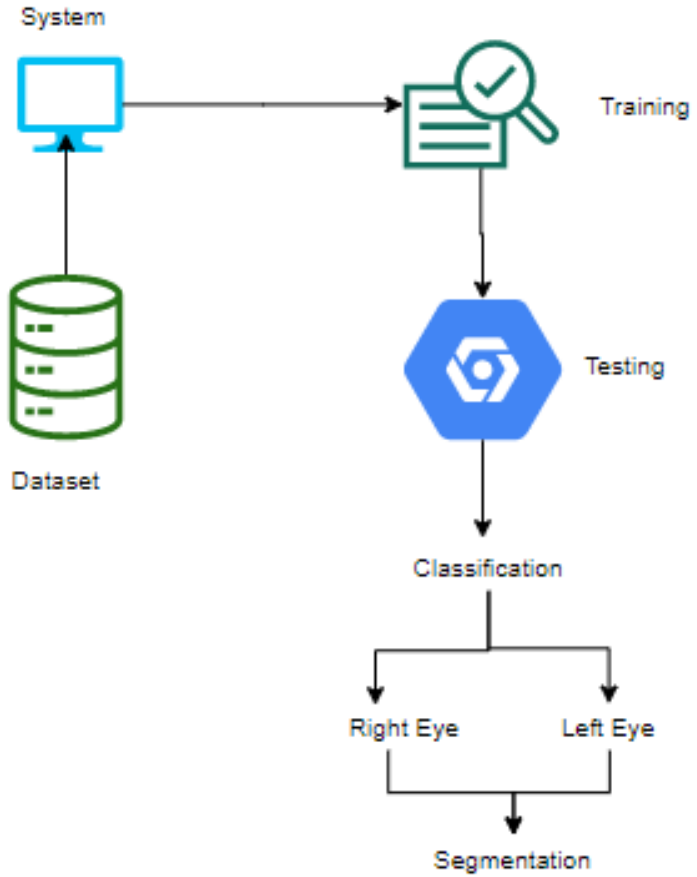


Fig. Project Architecture

UML DIAGRAM

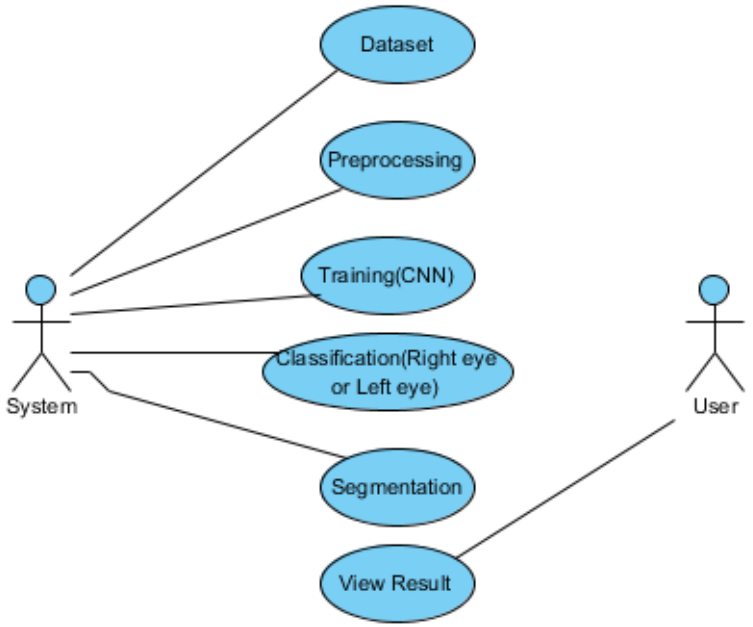


Fig. UML Diagram

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted

CLASS DIAGRAM

In software engineering, a class diagram in the Unified Modeling Language (UML) is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, operations (or methods), and the relationships among the classes. It explains which class contains information

Fig. Class Diagram

SEQUENCE DIAGRAM

- A sequence diagram in Unified Modeling Language (UML) is a kind of interaction diagram that shows how processes operate with one another and in what order.
- It is a construct of a Message Sequence Chart. Sequence diagrams are sometimes called event diagrams, event scenarios, and timing diagrams

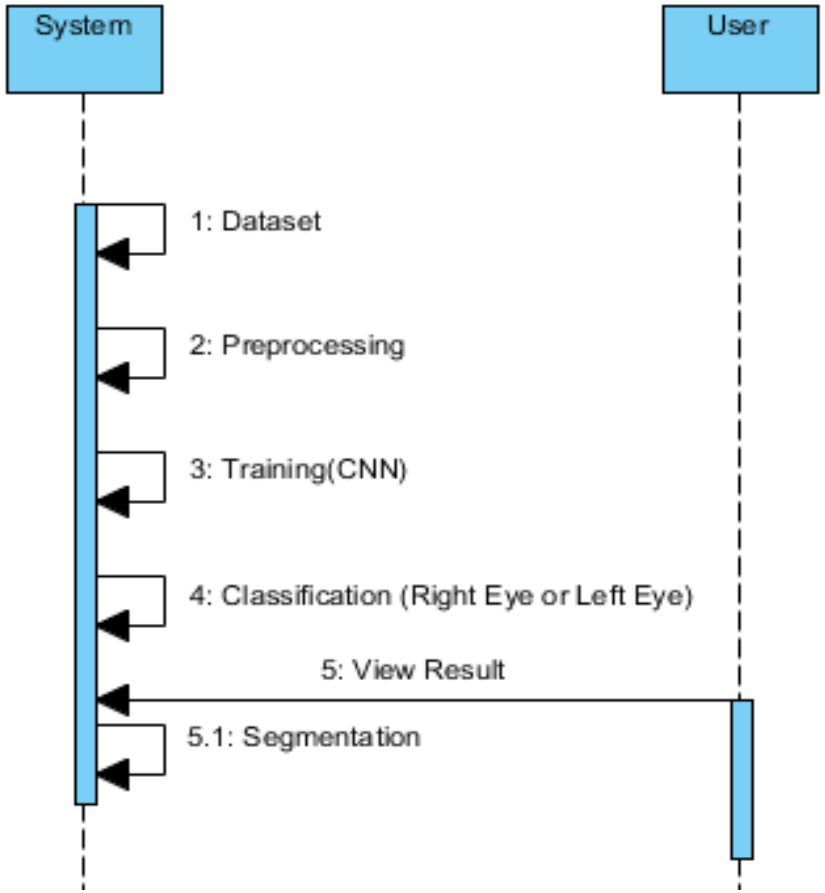


Fig. Sequence Diagram

ER DIAGRAM

- An Entity–relationship model (ER model) describes the structure of a database with the help of a diagram, which is known as Entity Relationship Diagram (ER Diagram).
- An ER diagram shows the relationship among entity sets. An entity set is a group of similar entities and these entities can have attributes.
- In terms of DBMS, an entity is a table or attribute of a table in database, so by showing relationship among tables and their attributes, ER diagram shows the complete logical structure of a database.

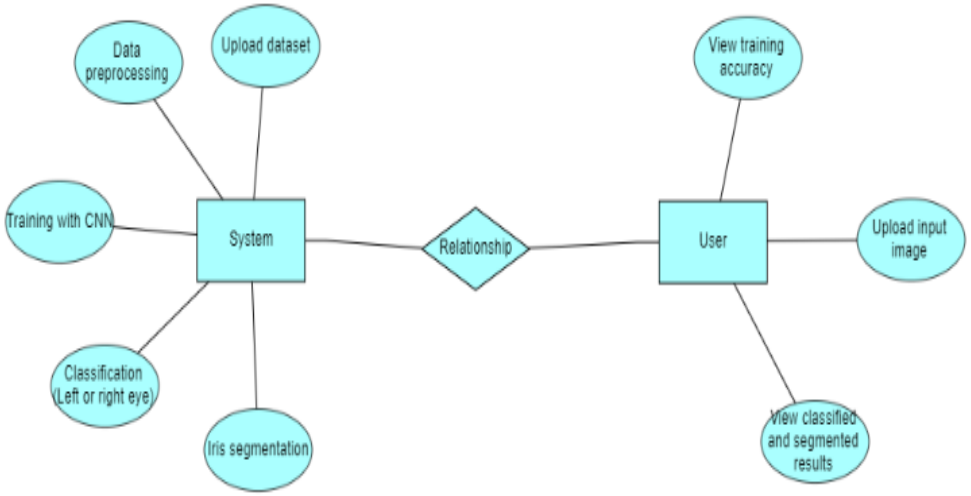


Fig. ER Diagram

DATA FLOW DIAGRAM

A Data Flow Diagram (DFD) is a traditional way to visualize the information flows within a system.

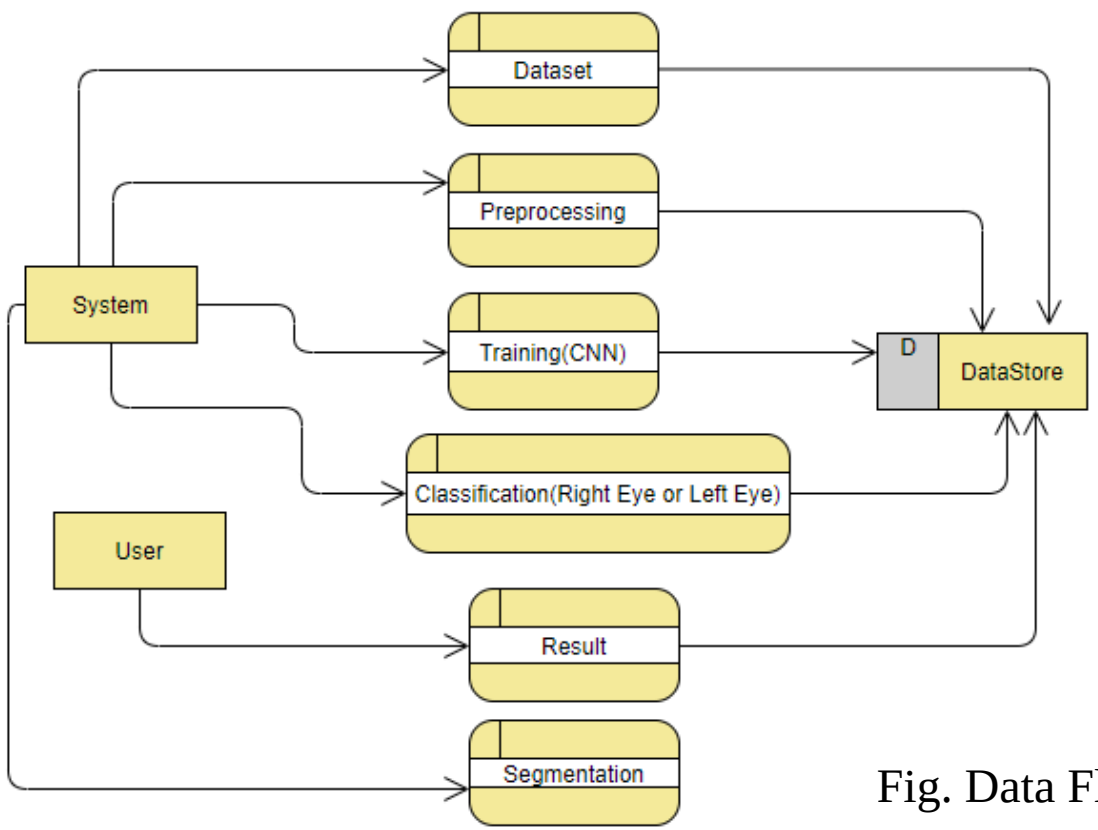
A neat and clear DFD can depict a good amount of the system requirements graphically. It can be manual, automated, or a combination of both.

It shows how information enters and leaves the system, what changes the information and where information is stored.

The purpose of a DFD is to show the scope and boundaries of a system as a whole.

It may be used as a communications tool between a systems analyst and any person who plays a part in the system that acts as the starting point for redesigning a system.

DATA FLOW DIAGRAM



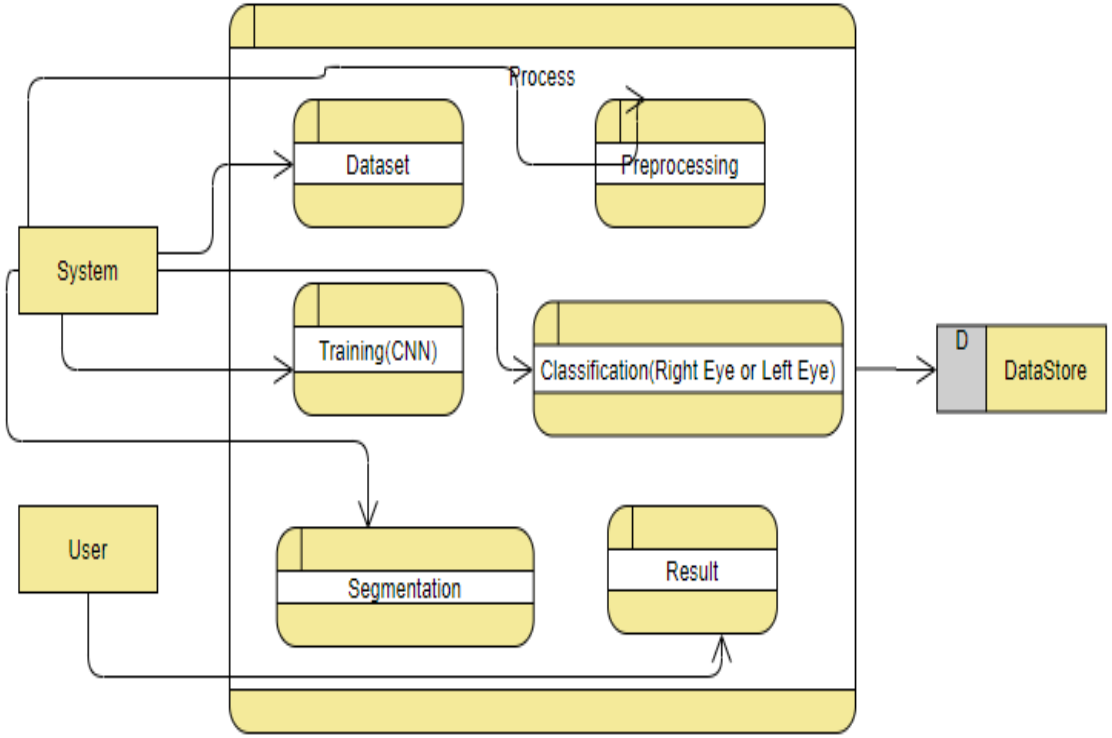


Fig. Data Flow Diagram

RESULT

- In this application, we have considered the dataset of eye images with the two classes (left and right eye) and trained using CNN based transfer learning algorithm.
- In the testing the image is uploaded and the image is classified and then the iris part is segmented.

CONCLUSION

In this project we have successfully classified the left or right eye image using the deep learning. Here, we have considered the dataset of eye classes and trained using CNN. After the training user can test by uploading the image and can check for the classified results. Once after the classification the iris part of the classified output is segmented.

FUTURE SCOPE

This process can be extended in future that which can be used for the biometrics. Mainly the biometrics based on the iris part will be more advantageous with this type of work.

REFERENCES

- Research Paper 1:

  2020 IEEE 10th International Conference on System Engineering and Technology (ICSET)

- Research Paper 2:

  International Journal of Computer Applications (0975 – 8887) Volume 175– No. 12

- Research Paper 3:

  Iris Recognition Using Low-Level CNN Layers Without Training and Single Matching (IEEE 2022)

- Research Paper 4:

  Iris Image Acquisition and Real-Time Detection System Using Convolutional Neural Network

Thank You !