Idea: Face and eye iris recognition system

Team: YeshwanthsAI

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1. Introduction

## Purpose:

To develop a fully functional and robust application ( an Web application or an mobile application or both) to identify a person based his facial features and eye iris. Though face recognition can be used to identify a person, they tend to change with age or some accidents. Eye iris is a very stable and doesn't change for years, So it makes a very robust approach to identify a person based on eye iris. When face recognition and iris recognition made together, then it becomes very powerful tool to identify a person at a very accurate level.

Our idea has two parts. First part deals with facial recognition system and second eye iris recognition system. When both act together, It becomes much more robust and accurate recognition system. There are many challenges in fully developing a project, we propose and implement some methods to solve them by using Machine Learning and image processing techniques.

Part 1:

**Face recognition:**

A facial recognition system is a technology capable of identifying or verifying a person from a digital image or a video frame from a video source. But when it comes to accuracy bio metrics are very crucial and more unique. Bio metrics like finger prints need contact, But a most sophisticated method is to identify person by his/her eye iris. So we are proposing a solution that includes face recognition with eye iris recognition.

**Problem Statement:** Identifying a person by image of his face.

Source: Git:

<https://github.com/yeshwanthdatascience/FaceDetectionChallange>

<https://github.com/yeshwanthdatascience/Face_recognition>

**Solution:** We build a engine or system where we first locate the face in an image for in a frame of a video, then we extract the orientation of the face. We make some necessary transformations to the orientation, in order to increase the accuracy. Then we feed them in to a trained Neural network model ( Convolution Neural networks) and extract the features. We then compare those features and identify the person.

**Description of the desired application:** Our solution is a Advance Neural network model that is designed to full fill following tasks:

1. Object detection and Identification of a face
2. Extracting and modifying the orientation
3. Extracting the features from the face
4. Identifying the person.
5. Object detection and Identification:

This model is built to identify and detect face from the image. This may be made entirely from scratch to have the optimum accuracy . By this way we consume much more time and resources. Instead we can use some transfer learning techniques to extract some trained models for object detection that are relevant to us.

Example: open cv python library has pre-trained library for two wheeler detection.

1. Extracting and modifying the orientation:

The face from the image may be in different orientation. We use machine learning and some functions in open cv library to change the orientation in order to get maximum accurate results.

1. Extracting the features from the face:

The image of the face is sent to the model, to extract the features from it. Depending upon the computation of the hardware we make some optimum size of the neural networks to make model face and less computationally heavy.

1. Identifying the person:

Now we compare with the images from our database. We end up resulting the most nearest face from our database.

**Solutioning:** We build a model with advance algorithms using machine learning, to full fill all the tasks we mentioned above. We make the data by extracting any useful images from the web and use image processing using scikit-image and opencv to prepare real world similar data set. Then we make a bunch of neural network models acting a single ensemble model to give required results. Then we prepare a api endpoint using flask library in python, where user can upload a image and then instantly gets the results of evaluation of the parking.

**Example:**

An user uploads a image or video.The input may also be live video recording.Then our model evaluates and identifies the faces from it.

**Part 2**

**Eye Iris recognition system**

**Problem Statement:** Identifying a person with help of his eye iris image.

Source: Git

<https://github.com/yeshwanthdatascience/Eye-Iris-detection-system>

**Solution:** We build a model that takes an image of eye and locates the eye and iris. Then we make required calculations and transformations. Finally we a rectangular code for an each eye and locate in our database.

**Description of the desired application:** This is a model, which involves following

1. Eye locator
2. Eye Iris location and transformation
3. Identifying with coded eye iris.
4. **Eye locator:**

We use same approach of face recognition system . How face is located in a image, we use same approach to locate the

Eye from the face.

1. **Eye iris location and transformation:**

There are many steps and tasks in order to make the circular image to a rectangular code. Some of the steps are stated below:

1. Normalization
2. Encoding
3. Matching distance metrics
4. **Identifying with coded eye iris:**

With help of saved encoded eye iris codes, we use related and robust distance calculating metrics and identify the person.

**Core user scenarios:**

Scenario 1: A image or a video frame is given to model.

Scenario 2: Model identifies the eye and locates the eye iris.

Scenario 3: We generate features and compare with the database and recognize the person.

**Solutioning:** We build a image processing pipeline to extract eye iris from an image. Then we make a model to identify the person based on the eye iris.

**Tech Stack:​**

Computer Languages:

Python

Frameworks:

Anaconda.

Database:

Sql.

Libraries:

TensorFlow, Keras, Numpy , pandas, scikit-learn, scikit-image, Flask, opencv and others

**Use Cases:**

1. When a person went missing and identified after some days, Our model instantly identifies him. Even if some of the facial features were changed due to some accidents, Our eye iris identify correctly identifies him
2. When a person went missing and unfortunately was not able to get to him up to some years, then there is chance of change is his/her facial features, Then his identity is still preserved and identified with our iris recognition system.

**Data Flow**

Showing User’s details

Validating

UI

Storing In DB

Getting User details

Mock diagrams: Home page Give details page

Name:

DOB:

Nationality:

Adhaar :

Image

**Give Details**

**Get Details**

Camera View

Capture

Name: XXX

DOB: xx-xx-xxxx

Nationality: xxxx

Adhaar : xxxxxxxx

Get details page

Data base: (SQL)

Features: Schema

Id Primary ID int

Name Text

DOB Date

Aadhar: Number

Pan: Alpha numeric

Image features: Array

**Conclusion**:

Face recognition combined with eye iris detector makes a robust model to identify a person.

\*\*Note: We are still in implementing the idea. Only basic approaches and implementation can be found in the git.