Biometrics (COMP 388-002/488-002)
Loyola University Chicago, Fall 2026
Assignment 4: Iris Recognition
Due date: December 06, 11:59 PM CT
Total: 10 points

1. Introduction

This assignment trains and evaluates students' ability to use a third-party iris recognition library, set the operating point, and perform biometric verification using NIR iris images collected in class. To do so, the iris recognition library and one zip file containing the collected irises are being provided.

1.1. Iris dataset

The iris dataset is available at https://tinyurl.com/5bdevtfn and is password-protected. To obtain the password, please contact the instructor (Daniel Moreira) through email (dmoreira1@luc.edu). **Students must not share this dataset with anyone and must delete it at the end of the course. Anyone breaking these rules will automatically fail the course.** Please refer to Prof. Moreira if you have any questions.

The iris dataset is organized into two folders, namely "dataset" and "queries". The "dataset" folder contains 24 NIR images depicting 12 unique irises (two images per iris), whose names obey the following format: "`<IRIS_ID>_<CAPTURE>.png`". As a consequence, two files with the same `<IRIS_ID>` depict the same eye and comprise a genuine pair. Figure 1 provides the content of the "dataset" folder with the 24 images.

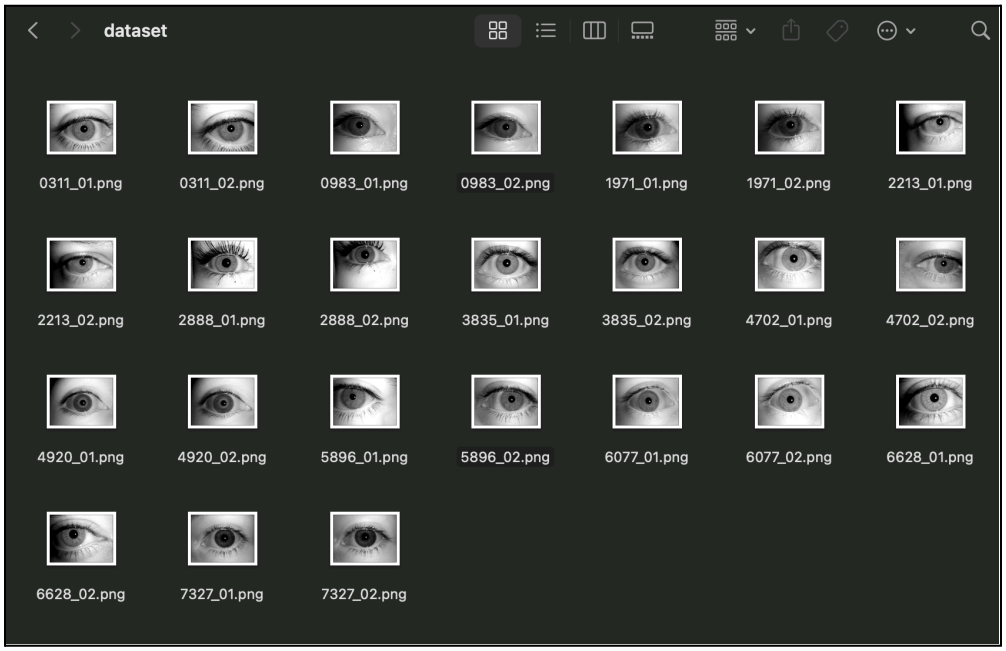


Figure 1. Content of the "dataset" folder.

The “queries” folder, in turn, contains five image files whose names obey the format “<CLAIMED_IRIS_ID>.png”. These five images do not have exact copies in the “dataset” folder, and <CLAIMED_IRIS_ID> represents the claimed eye in a biometric verification scenario against the content of the “dataset” folder. Figure 2 depicts the content of “queries”.

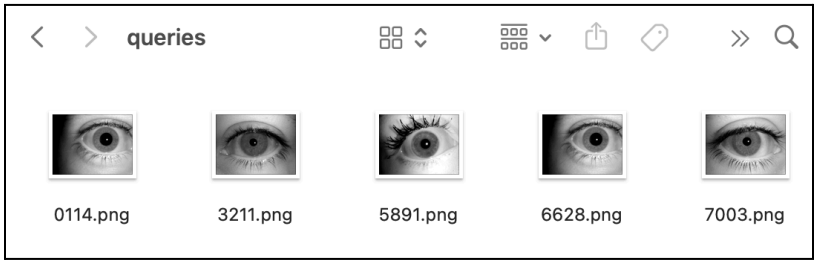


Figure 2. Content of the “queries” folder.

1.2. Iris recognition and metrics libraries

The iris recognition library is available as a Google Colab notebook (https://tinyurl.com/m2k72jzw), which was explained in class. In addition to this implementation, you will also need either the first assignment’s notebook (metrics’ implementation, available at https://tinyurl.com/53knr8y5) or the *scikit-learn* (https://tinyurl.com/nsyu2k9b) library to compute the proper metrics and analyze the performance of the system.

1.3. Assignment directions

To complete this assignment, access the Google Colab notebook (https://tinyurl.com/m2k72jzw) and make your own copy. After downloading and unzipping the dataset from Sakai to your local computer, upload its contents to your Google Colab notebook copy. Lastly, follow the instructions and answer the questions presented in Sec. 2.

There is no formal template for providing your answers. You may use the editor you like. The following submission is expected:

- A single PDF file or Word document containing your answers.

Please submit your file through the respective open assignment in Sakai by December 06, 2026, 11:59 PM CT.

2. Questions

2.1. As explained in class, the provided third-party iris recognition library can extract the binary code from a given NIR iris image, as well as calculate the distance between two computed iris binary codes. The software is expected to produce small distances for two iris images depicting the same eye (genuine pair) and large distances for two iris images depicting different eyes (impostor pair).

Using **only** the “dataset” folder in the iris dataset, the third-party iris recognition library, and the metrics learned in class, **determine a good binary iris code distance threshold to**

separate genuine from impostor pairs. While providing your answer for the distance threshold, please explain in detail how you computed it. (4 points)

Answer tips: good answers will describe what you did, such as “I generated *x* genuine and *y* impostor pairs, and observed FNMR and FMR at EER…”, etc.

2.2. By leveraging the distance threshold computed above, please classify each one of the five iris images provided within the “queries” folder of the iris dataset as either **genuine** (i.e., the `<CLAIMED_IRIS_ID>` is correct) or **impostor** (i.e., the `<CLAIMED_IRIS_ID>` is incorrect). Please justify your answer for each case by providing the distances obtained with the iris recognition library and comparing them to the distance threshold. On the occasion of being possible to get more than one iris code distance for a particular `<CLAIMED_IRIS_ID>`, please base your decision on the minimum distance as the best effort to perform biometric verification. (6 points)