CECS 551
Assignment 9
Total: 79 Points

General Instruction

- Submit uncompressed file(s) in the Dropbox folder via BeachBoard (Not email).

1. Develop face recognition software using an implemented and pre-trained network for Triplet Loss. Please note that you don't need to implement and train it.

   (a) (9 points) By this evening, zip 16 raw image files which were used for the previous face detection assignment using the name 'Group ID-First Name-Last Name.zip' and upload the zip file into 'BeachBoard - Discussions - Dataset - Face Images by clicking 'Start a New Thread'. Write your **Group ID-First Name-Last Name** at the subject line. (All of team members should upload their own image files separately.)

   (b) Download image of all members of all groups from BeachBoard.

   (c) Please review *this article*.

   (d) Search and study an implemented and pre-trained deep learning architecture to generate embedding vectors of Triplet Loss. You can use any open source code.

   (e) Adapt one or more implementations, and import them into your workstation.

   (f) (25 points) By combining one of the member's face detection software and pre-trained deep learning architecture, implement software as follow. Please use the name `image2vect.py`

   - Input: An image (x) which includes a human face.
   - Intermediate step: Find bounding box of the face in the input.
   - Output: Embedding vector ($f(x) \in \mathbb{R}^d$) in d-dimensional Euclidean space of the bounding box. The embedding vector should be normalized, i.e. $||f(x)||_2 = \sqrt{\sum_i^d f_i(x)^2} = 1$.

   (g) (25 points) Implement group member recognition software as follow. Use the name `imageFinder.py`.

   - Input: A group ID
   - Intermediate steps
     1. Using the highest p_c of the face detection software, store one image for each member in the group. In total, you should have three images since a group includes three members.
     2. Using `image2vect.py`, recognize the images of the group members from 333 images. Definitely, you can't utilize the file names.
   - Output: Images of group members.

(h) (20 points) At least for three distinct recognition threshold τ values and evaluate the performance of `imageFinder.py`. Summarize your result into a single `pdf` file. The report should include

- The average precision and recall values of all group IDs.
  $\text{Precision} = \frac{\text{\# of correctly recognized images}}{\text{\# of recognized images}}$
  $\text{Recall} = \frac{\text{\# of correctly recognized images}}{\text{\# of actuall images in the group}}$
- Software usage instruction. (How to run your programs)

(i) Submit the report and the software package including necessary files for the software such as pre-trained weight values and input image files.