**Genuine and Impostor Attempts calculation in a One-shot Enrolment Setting:**

There are 200 people in the dataset.

Each person has 9 poses.

Total Images: 200 \* 9 = 1800 images

**Genuine Attempts Calculation:**

To calculate the number of genuine attempts, we need to consider all possible pairs of images from the same individual. Since each person in the dataset has 9 images, we can calculate the total number of pairs of images per person using the following formula:

Number of pairs per person = (Number of images per person) x (Number of images per person - 1) / 2

Substituting the values, we get:

Number of pairs per person = 9 x (9 - 1) / 2 = 36

Therefore, the total number of genuine attempts in the dataset can be calculated by multiplying the number of pairs per person by the number of individuals in the dataset, which gives:

Total number of genuine attempts = (Number of pairs per person) x (Number of individuals)

Total number of genuine attempts = 36 x 200 = 7,200

Hence, the number of genuine attempts in the dataset is 7,200.

**Impostor Attempts Calculation:**

The number of impostor attempts is calculated based on the number of pairs of images from different individuals in the dataset. In a multi-shot enrollment setting, where each individual has multiple images, we need to consider all possible pairs of images between different individuals.

In this case, there are 200 individuals in the dataset, and each individual has 9 images. To compute the number of impostor attempts, we need to consider all possible pairs of images between different individuals. The total number of such pairs (i,j) where i,j belong to different individuals can be calculated as:

For person 1, there are 9 \* {(200-1)\*9} image pairs

For all 200 persons there will be [9 \* {(200-1) \* 9} \* 200 ]/ 2

Total number of impostor attempts = 1611900

How to compute and plot

1. Genuine Accept Rate (GAR)
2. False Reject Rate (FRR)
3. False Accept Rate (FAR)
4. DET Curve
5. ROC Curve
6. Equal Error Rate
7. Genuine and Impostor Score Distribution

Inputs:

1. Dataset will have a total ‘x’ subjects S1, S2, … , Sx. Each subject Si can have any number of poses greater than or equal to 2. For example, Subject S1 can have 5 poses, S2 can have 8 poses etc.
2. Feature Vectors for all the images in the dataset.

Steps:

1. Write a program to
   1. Compute the total number of Genuine attempts as discussed in the example above.
   2. List all pairs (in Genuine Attempts) and compute the similarity score. [You can compute the cosine similarity score between the 4096 dimensional feature vectors and thereafter normalize them to a scale of 0 to 1.]
   3. Use a loop from 0 to 1 with increments of 0.01 [This loop represents the varying threshold values]
   4. For each threshold, compute the number of genuine pairs for which the similarity score is greater than or equal to the threshold. Lets say this number is ‘a’
   5. Genuine Accept Rate (GAR) = a / total number of genuine attempts
   6. False Reject Rate (FRR) = 1 – GAR
2. Write a program to
   1. Compute the total number of Impostor attempts as discussed in the example above.
   2. List all pairs (in Impostor Attempts) and compute the similarity score [You can compute the cosine similarity score between the 4096 dimensional feature vectors and thereafter normalize them to a scale of 0 to 1.]
   3. Use a loop from 0 to 1 with increments of 0.01 [This loop represents the varying threshold values]
   4. For each threshold, compute the number of impostor pairs for which the similarity score is greater than or equal to the threshold. Lets say this number is ‘b’
   5. False Accept Rate (FAR) = b / Total number of Impostor Attempts
3. Plotting DET and ROC Curves
   1. For DET curve, you will have False Reject Rate (FRR) on the Y axis and False Accept Rate on the X axis
   2. For ROC curve, you will have Genuine Accept Rate (GAR) on the Y axis and False Accept Rate on the X axis
4. Equal Error Rate (EER): EER is the location on a ROC or DET curve where the false acceptance rate and false rejection rate are equal. In general, the lower the equal error rate value, the higher the accuracy of the biometric system.
5. Plotting the Genuine and Impostor Score Distribution

Please refer the figure below, to plot the Genuine and Impostor Score Distribution

