Homework3

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We implement these system with Python onpencv library. We use the front, left, right, center-light, left-light, right-light images of per subject as gallery and use 2 images per subject as probe.

In the **FaceDetectandCrop.py**, we use the Haar-cascade Face Detection method to extract faces from images containing faces. After the detection, we obtain the position and the size of the faces (front faces) then i save in the same directory. In order to prevent the influence from varying illumination conditions. we use gamma correction to get the visible images. Gamma Correction is a nonlinear gray-level transformation for illumination adjustment.

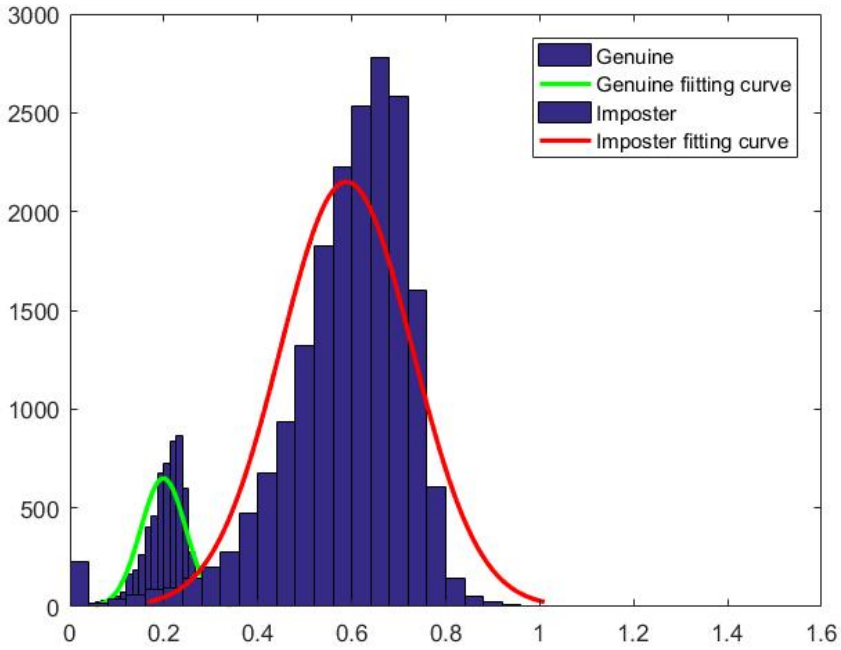
In the **generateFeatures.py,** we use SURF to get the features of each images. In the **compare.py,** we compare the feature of images in gallery and probes. The match scores is between 0 and 1.

The general idea of getting the genuine and imposter distribution is:

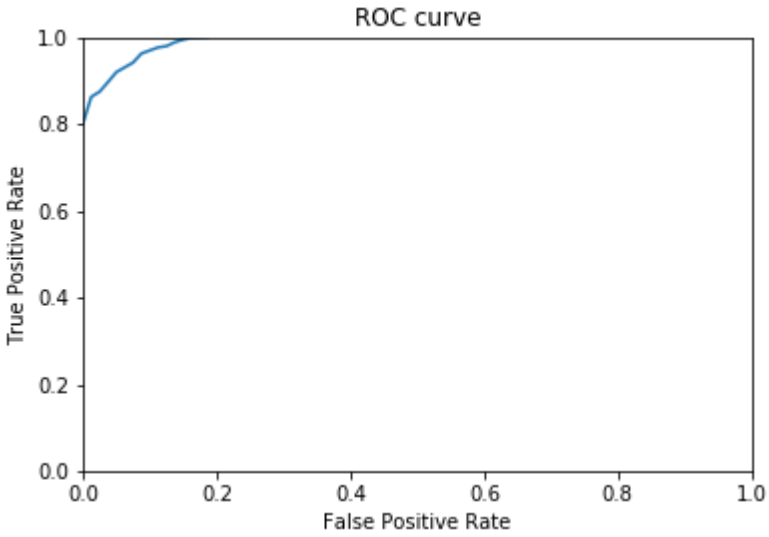
```
For gallery_image in gallery:
    For probe_image in probes:
        run compare.py
        get the match score
        If two photos are from the same subject:
            genuine_distribution.add(score)
        else
            imposter_distribution.add(score)
        endIf
    endFor
endFor
```

In the **drawGIDandROC.py**, we plot the distribution of genuine and imposter and ROC. In the **drawCMC.py,** we plot the CMC.

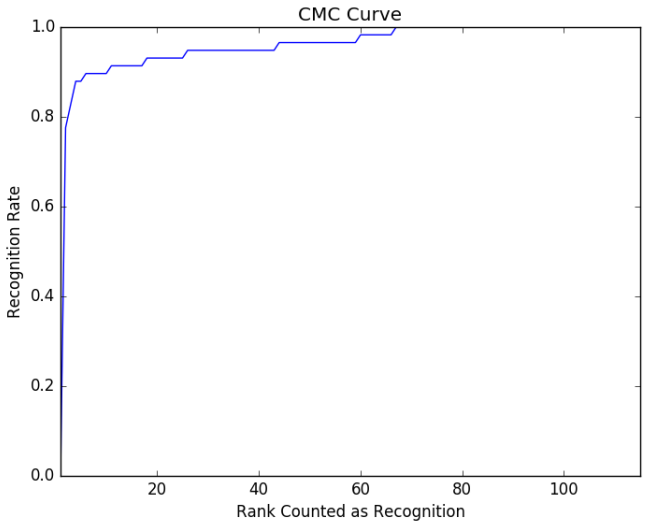
The distribution of genuine and imposter is below:



The ROC is below:



The CMC is below:



Findings:

The accuracy of this system is much better than the iris biometrics system in homework2.

The change in glasses, lighting and facial expression have effect on the match score for the same subject.