Report for Task5

From the paper 47, We think that we can identify Deep 3D Face Identification using Dimensionality reduction techniques is developed to resolve this problem. (PCA) and Linear Discriminant Analysis (LDA) are two of the most popular dimensionality reduction techniques. we implement the Laplacianface approach (representation and recognition), which explicitly considers the manifold structure

We implement these system with Python onpencv library. We use the database used for testing is Yale Database A, which contains 165 grayscale images in GIF format of 15 individuals. There are 11 images per subject, one per different facial expression or configuration: center-light, w/glasses, happy, left-light, w/no glasses, normal, right-light, sad, sleepy, surprised, and wink.

The implementation can be divided into four parts: face clipping, face normalization, face representation and face recognition.

Firstly, we use the Haar-cascade Face Detection method to extract faces from images containing faces. It involves face detection to locate the position and range of face in the image. After the detection, we obtain the position and the size of the faces (front faces).

Then it is about face normalization, which here mainly prevent the influence from varying illumination conditions. It includes three steps: gamma correction, Difference of Gaussian (DOG) and contrast equalization. Gamma Correction is a nonlinear gray-level transformation for illumination adjustment. Difference of Gaussians is a grayscale image enhancement algorithm that involves the subtraction of one blurred version of an original grayscale image from another, less blurred version of the original. The final stage of preprocessing aims to rescale the image intensities.

Then we use Laplacianfaces algorithm to get face vectors.

At last, since the face vectors processed by the three representation methods are all well normalized, we dimply use dot product of two face vectors as their similarity.

To recognize a face vector, it should be processed by the same face representation method as the training data first. Then we find k nearest neighbors of it in the training data using dot product as method of similarity measurement. We regard the value of similarity as score and sum all scores whose corresponding training cases belong to the same class. The face x' for test belongs to some class if the score of that class is highest.

Reference

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S.Anila & Dr.N.Devarajan, “Preprocessing Technique for Face Recognition Applications under Varying Illumination Conditions”, Global Journal of Computer Science and Technology, Graphics & Vision, Volume 12 Issue 11 Version 1.0 Year 2012

Face Recognition with OpenCV, https://docs.opencv.org/2.4/modules/contrib/doc/facerec/facer ec_tutorial.html