Emotion recognition learning using LDA based on OpenCV

In this learning method, we deployed some built-in package within opencv(3.2.0) in Ubuntu 16.04. The FisherFaceRecognizeer using information theory approach. It codes and the decodes face images to gain recognition. Instead of using PCA, it uses linear discriminant analysis. Following are the steps we did.

OpenCV offers methods to extract faces in a picture. The dataset we are using is called Cohn-Kanade database, which contains 593 pictures from 123 people. We batch the pictures of different emotions into different sets with different emotion label(each picture captured is the size of 350 pixel \* 350 pixel). After a format-based labeling, in order to make the result more convincing and unbiased, we also remove duplicate faces(e.g. same person with same emotion label). Basically this step is hard to be done by machine so we were manually removing those that may lead to biased result. And finally we got 355 images with 8 different emotions : anger contempt, disgust, fear, happy, neutral, sadness and surprise.

After sort and filter the result, we are using a FisherFaceRecognizer to train this dataset processed. For each epoch iteration, we use cross validation to test the accuracy of this training method, we randomly pick 80% of the set to be training data and use the rest to be the test set. After testing over 8 different labels of emotions, we found we reach an average accuracy of about 20%, while some of the labels only have some accuracy of below 15%. We believe this was a really terrible result since random guess is about 12.5% accuracy.

We try to remove some labels that have very few examples, like “contempt”, “fear” and “sadness”. We have slight improve when applying this change to the training. However, still we have a very low accuracy of around 23.61%.

**Reference**

- Kanade, T., Cohn, J. F., & Tian, Y. (2000). Comprehensive database for facial expression analysis. Proceedings of the Fourth IEEE International Conference on Automatic Face and Gesture Recognition (FG'00), Grenoble, France, 46-53.

- Lucey, P., Cohn, J. F., Kanade, T., Saragih, J., Ambadar, Z., & Matthews, I. (2010). The Extended Cohn-Kanade Dataset (CK+): A complete expression dataset for action unit and emotion-specified expression. Proceedings of the Third International Workshop on CVPR for Human Communicative Behavior Analysis (CVPR4HB 2010), San Francisco, USA, 94-101.

https://docs.opencv.org/trunk/d2/de9/classcv\_1\_1face\_1\_1FisherFaceRecognizer.html