9517 Project 2 Report

Tianqi Liu 5019791

Hanzhang Zeng 3493047

2016-10-03

1 General Purpose

We attempt to train the Fisherface recogniser with sets of data faces. In order to make FisherFace work with high accuracy, the data set should have fixed size, therefore, we use Harr-cascade to extract the face.

2 Face Extraction

When we collecting expressions from different images, we want to discard the background and other objects in the photos in order to increase the correctness of training and prediction. We use the Haar-cascade classifier. According to the Viola and Jones's object detection framework, the classifier determines the feature points by calculating the Haar-like feature by looking up to multiple rectangles (feature types) and applying the mask on the region to summarise the characteristics of the specific image.

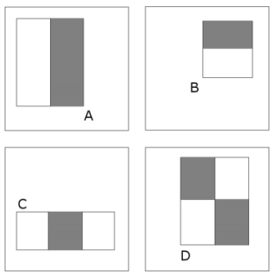

Figure 1: The Viola detection framework evaluates the characteristics in an image based on four kind of Haar feature

In the OpenCV implementation of Haar classifier, an improvement is made by Rainer Lienhart. Rainer took the advantages of a 45° rotation on all the Haar features that Viola had and categorised them into four groups: Edge, Line, Centre-surround and the special diagonal line feature (Viola feature D).

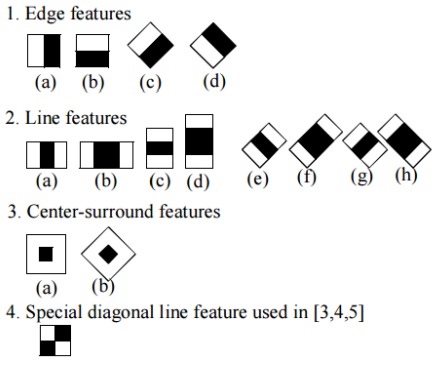

Figure 2: The Rainer classifier takes advantages of rotation and enhanced line feature detections

In this project, we use frontal face cascade classifier provided by Intel Corporation. The Haar features of frontal face can be visited in OpenCV repository on GitHub.

3 Haar-cascade Training

To train the Haar-cascade classifier, we need a large set of positive and negative data. The Haar-cascade algorithm extracts features using the difference between sum of pixel and using the Adaboost to eliminate negative features. At the end, the final classifier is the weighted sum of these weak classifier.

4 Fisherface Recogniser

We use Fisherface algorithm to detect the emotion of faces. Before hand, we need to train the emotion recogniser with a large set of face images in different emotion categories (netural, angry, happy and sad). We use Cohn-Kanade database to feed our program in order to enhance its prediction accuracy.

5 Fisherface Recogniser Training

To use the Fisherface recogniser, we prepare two sets of data, one is the training data and the other one is the test data. We feed the classifier with the training data set. The Fisherface algorithm uses LDA(Linear Discriminant Analysis) which basically downgrades the image by mapping the points to a smaller orthogonal matrix which will serve as bases for the class, such that the between class distance is maximised and the within class scatter is minimised.

6 Bibliography