

BIOMETRICS

Winter 2011

Homework 3: Hand Geometry Classification

Due: Tuesday, March 1, 2011



Figure 1: Hand Geometry Recognition

Lab Description:

In this lab you will attempt to recognize people from their hand geometry. To do this you will be given 124 total outlines taken from 16 hands. 62 of the outlines will be labeled. 62 of the outlines will be unlabeled. The hand outlines came from two runs. During the first run we gathered 10 outlines per person for ten people. During the second run, we only gathered 4 outlines per person for six people.

Your job will be to extract the features, train two different classifiers using the labeled samples, and then recognize the 58 remaining unlabeled samples.

Where to get the Outlines:

The outlines will be posted to the course website.

What to Program:

You should first decide on which features of the hand you want to use for classification. You must use a minimum of 4 features, though you may use more. The same features must be extracted from each image. While you could write code to extract your features you can also do this manually, using for example a ruler and entering the features manually into a file, or using any program that allows you to read in an image and measure distances.

Because this process can be tedious, you can work in pairs to extract features, but the classification schemes should be your own.

You will then create two classifiers, which take these features as input. One classifier should be probabilistic in the sense that you compute some sort of statistic from the enrollment data. The other could be whatever you want (e.g., k-th nearest neighbor).

You should then train your classifiers and perform recognition on the test set. The output should be a table where the first column is the image number (as written on the image) and the second column contains the recognition result.

You can use whatever language you like.

The training outlines are numbered 1-50 and 101-112. The test outlines are 51-100 and 113-124. The subjects are named S1,...,S16.

Evaluate your methods using five fold cross validation on images 1-50 of the ten subjects. There aren't enough images to do this on the other 6 subjects. That is, train on 4 images per subject, and test on the remaining images. Determine the error rate. Repeat this 5 times and average the error rates.

What to Hand In:

Students must hand in the following:

1. A description of the experimentation done, including the logic behind your choice of features and classifiers.
2. The results of the five-fold cross validation on your two classifiers.
2. A printout where the first column contains the outline number (51—100, 113-124) and the second column contains the ID. If you implement this in Matlab, it would be appreciated if you saved the results as a .mat file so that the results can be automatically evaluated.