

BIOMETRICS

Fall 2013

Assignment 4: Hand Geometry Classification

Due: October 29, 2013 at 5pm via Courseworks



Figure 1: Hand Geometry Recognition

Lab Description:

In this lab you will attempt to recognize a person from their hand geometry. To do this you will be given 200 total outlines taken from twenty hands. One hundred of the outlines will be labeled, five for each hand. One hundred of the outlines will be unlabeled. As the raw feature data we will give you the x and y locations of points along the contour. Your job will be to extract features from the raw point locations, train a classifier using the labeled samples, and then recognize the 100 remaining unlabeled samples. (Note that there will not necessarily be 5 unlabeled outlines per hand.)

Where to get the Data:

The raw feature data (a series of click point locations for each hand) will be posted to the course web page. There will be two files: one for training and one for testing.

What to Program:

You can use any of the classification algorithms explained to date or listed in the book. Please write your program in Matlab.

What to Hand In:

Please put all your files into a directory named `hw4_{your_UNI}`, zip it into a file named `hw4_{your_UNI}.zip`, and submit it using the "Assignments" feature of Courseworks. The name of the assignment in Courseworks is "HW4." Simply upload your zipfile as an attachment and submit the assignment. Your submission should include the following:

1. A well-written report on the experimentation done, including an explanation of how you chose which classifier and features to use. Include a description of any preliminary experiments or analysis you performed while building your classifier (e.g. scatter plots you

used to find discriminative features or cross-validation results of different classifiers you tried). This should be a pdf document, named `report.pdf`.

2. Your well-commented source code. You should have one **function**, `classifier.m`, which should be callable like this:

```
>> classifier(path-of-training-file, path-of-test-file, ...  
            output-path-for-edited-training-file, output-path-for-edited-test-file)
```

3. An edited testfile -- where the word **test** is replaced on each line by the results of your classifier, e.g., **dolphin**, **sheep**, **tiger**, etc. Name this file `testfile_output.txt`.

4. An edited trainfile -- where the true class is replaced on each line by the results of your classifier, e.g., **dolphin**, **sheep**, **tiger**, etc. Name this file `trainfile_output.txt`.

`testfile_output.txt` and `trainfile_output.txt` should have been produced by running your `classifier()`.

Grading:

The mark allocations will be the same as for the previous lab.

File Format of the Extracted Features:

Columns

1. Sample class
2. x location of feature point 1
3. y location of feature point 1
4. x location of feature point 2
5. y location of feature point 2
- .
- .
- 2n. x location of feature point n
- 2n+1. y location of feature point n