

## Assignment 3

Deadline: Tuesday, 29.11.2011

### Assignment 3.1 (20 Points)

Develop a generic program for image classification. The program's task is to distinguish between digital images annotated with two classes, e.g. aeroplane image or bicycle image (there is either class 1 (a plane) or class 2 (a bicycle) on each image).

For testing your image classification program, download 8 aeroplane and 8 bicycle images from:

<http://pascallin.ecs.soton.ac.uk/challenges/VOC/voc2011/examples/index.html#aeroplane>

Remember the key components of a generic image classification program:

- 1) Feature extraction: rescale your RGB images to a size of  $2 \times 2$  but retain each of the three RGB dimensions. How many predictor variables  $x$  do you have? Use all remaining intensities of your rescaled  $2 \times 2$  RGB image as predictor variables for the image classification task.
- 2) Annotation with class labels: Annotate each of the 16 images correctly. Use 1 for coding aeroplanes and 0 for coding bicycles.
- 3) Training: Include SVM as standard classifier into your program. Check the documentation of SVM in R by
  - loading the library(e1017)
  - and invoking the documentation by typing “?svm()” into the command line
- 4) Testing: Include a routine that computes the accuracy of your classifier for some given images.
  - a) [12 Points] Create a generic image classification program which includes all 4 components.
  - b) [6 Points] Try different features for your classifier, i.e. (1) a  $1 \times 1$  scaled RGB image and (2) the average of its R, G and B intensities.
  - c) [2 Points] Plot the different accuracy scores and discuss the results.