Exercises for
Pattern Analysis
Marco Bögel, Sebastian Käppler
Assignment 1, 18/19.04.2016

General Information:

Lecture (3 SWS):	Mo 08.30 – 10.00 (H16) and Tue 08.15 – 09.45 (H16)
Exercises (1 SWS):	Tue 12.15 – 13.15 (02.134-113) and Thu 8.30 – 9.30 (E1.12)
Certificate:	Oral exam at the end of the semester
Contact:	marco.boegel@fau.de
	sebastian.kaeppler@fau.de

Pattern Recognition - Revisited

Exercise 1 Bayesian Classifier

(a) What is the difference between discriminative and generative modeling?

(b) What is the decision rule of the Bayesian classifier?

(c) Simplify the decision rule if there is no prior knowledge about the occurrence of the classes available.

(d) Show the optimality of the Bayesian classifier for the $(0, 1)$ loss function.

Exercise 2 Naive Bayes

(a) Which independency assumption is used for naive Bayes?

(b) What is the decision rule of naive Bayes?

(c) What is the structure of the covariance matrix of normal-distributed classes in naive Bayes?

Exercise 3 Gaussian mixture models and EM

(a) Write down the general form of a Gaussian mixture model (GMM).

(b) Which parameters of the GMM can be estimated using the EM algorithm?

(c) How do you initialize the EM algorithm?

(d) Describe the basic steps of the EM algorithm for GMMs.