



General Information:

Exercises (1 SWS): Tue 12:15 – 13:45 (0.154-115) and Fri 08:15 – 09:45 (0.151-115)
Certificate: Oral exam at the end of the semester
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Refresh Your Knowledge

Exercise 1 Bayesian Classifier

- What is the difference between discriminative and generative modeling?
- What is the decision rule of the Bayesian classifier?
- Simplify the decision rule if there is no prior knowledge about the occurrence of the classes available.
- Show the optimality of the Bayesian classifier for the $(0, 1)$ loss function.

Exercise 2 Discriminant Analysis

- Write down the objective function for PCA.
- Write down the objective function for LDA.
- Describe the differences between PCA and LDA.

Exercise 3 Maximum likelihood (ML) estimation

- Write down the log-likelihood function to estimate the parameters μ and Σ of a Gaussian probability density $p(x; \mu, \Sigma)$ from training data $\mathbf{x}_1 \dots \mathbf{x}_m$.
- Write down the ML estimators for μ and Σ .

Exercise 4 Naive Bayes

- Which independency assumption is used for naive Bayes?
- What is the decision rule of naive Bayes?
- What is the structure of the covariance matrix of normal-distributed classes in naive Bayes?

Exercise 5 Support Vector Machine

- Write down the objective function for Rosenblatt's Perceptron.
- Write down the optimization problem for SVM.
- Explain the difference between Rosenblatt's Perceptron and SVM.