Exam Course H02D3A Support Vector Machines: Methods and Applications

There are 3 computer excercise sessions for this course, where support vector machines are tried on "toy problems" as well as real-life data sets including e.g. biomedical data, images, time-series. Each student has to deliver an individually written report about these computer excercise sessions. At the exam a further oral discussion (20 min. per person) about the report takes place such that you can clarify pictures, discussions and obtained conclusions. During this oral discussion also additional "insight-questions" will be asked to check your general insight about the course. Examples of such typical questions are e.g.

- What are advantages and disadvantages of support vector machines versus multilayer perceptrons?
- What do we mean by sparseness of support vector machines? Why is this important?
- How can we determine tuning parameters of support vector machines?
- What's the basic principle of kernel principal component analysis?
- Why are support vector machines suitable for learning and generalization in high dimensional input spaces (like microarray data, images, textmining, ...)?
- What do we mean by feature map and Mercer kernel?
- Compare Vapnik's epsilon insensitive loss function with least squares: what's the difference in terms of computations, robustness and spareness?
- What's the advantage of Bayesian inference for least squares support vector machines?
- What's the objective of kernel Fisher discriminant analysis?
- How can we apply least squares support vector machines to very large data sets (e.g. datamining problem with 1 million data points)?
- Explain input selection and automatic relevance determination for kernel machines. Why is this important?
- How can we use support vector machines for time-series prediction? Which issues are important to obtain good predictions?
- How can we denoise images using kernel principal component analysis?

This is all "open-book" i.e. you may bring all your course notes to the exam or any other material that you may find relevant or helpful.