Sample questions for the Pattern Recognition Course test

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1. In Bayesian Decision Making, define the risk (i.e. expected loss) of a strategy (i.e. of a decision rule).
2. Minimum-error-rate classfication and its relation to Bayesian risk minization.
3. Describe limitations of Bayesian ddecision making.
4. What is the decision function for a two-class classification problem The distribution of observations in both classes is Normal, with identical covariance matrices C; their means differ.
5. Define a classfication problem with the the reject option.
6. Define the Neyman-Pearson formulation of the decision. What is the optimal decision strategy for the problem?
7. Define the min-max formulation of the classification problem. What is the optimal decision strategy for the problem?
8. Define Wald decision making problem. What is the optimal decision strategy for the problem?
9. Describe the Maximum Likelihood method for parameter estimation.
10. Density estimation via Parzen windows.
11. Describe the k nearest-neighbour rule.
12. Specify at least 5 properties of the nearest-neighbour classifier.
13. Discuss speed-up techniques for the nearest-neighbour rule.
14. Describe the perceptron learning algorithm and its properties. Explain how the perceptron learning algorithm can be viewed as gradient descent.
15. Linear decision function: describe one or more statistical models, i.e. conditional probabilities $P(x|k)$, where linear decision function t sPro které rozpoznávací úlohy je lineární diskriminační funkce optimálním řešením?
16. Describe a feed-forward Neural Net.

17. The back propagation algorithm and its properties.

18. Describe a Support Vector Machine. Define the optimization task solved in SVM learning.

19. Compare learning of feed-forward neural net by back-propagation and SVM learning.

20. Which properties a kernel function possess? Examples of kernels commonly used in SVM learning.

21. What are the differences in properties of the SVM and perceptron learning algorithms?

22. Define the emprical risk (of classifier on a training set T) and its structural risk.

23. How is non-separability of data handled in SVM learning?

24. The Adaboost learning algorithm. Description, properties.

25. The EM algorithm.