

1. HMM: (slides, rabiner, Stanford x2)
 - a. Forward-backward (ex8 t3, ex9 t2)
 - b. Viterbi
 - c. EM (learning)
 - d. Baum-Welch (ex8 t1&2, ex9 t1, bishop)
2. Log-sum-exp trick, exercise3 task2 (Hidden Markov perceptron learning)
3. Exercise 4, task 1 & 2 & 3 (very important)(contain examples of primal and dual perceptron):
 - a. Primal and dual perceptron (slides, altun, notes)
 - b. Scoring function (dual perceptron)
4. CRF, MRF: (ex6)
 - a. Partition function (ex5) & potential function
 - b. Feature Template (ex5)
 - c. Structure perceptron for CRF (ex5)
 - d. MAP estimation vs Posterior (slides)
5. Expectation Maximization: (ex6, ex7)
 - a. Mixtures of Bernoulli distributions (bishop, 9.3.3)
 - b. Jensen's inequality
 - c. Kullback-leibler divergence (bishop? Or ex7 t2)
6. HM-SVM: (altun, collins, SVM stanford)
 - a. Working set optimization (ex9 t3)
 - b. Dual of soft margin HM-SVM (ex9 t3)
 - c. Penalty term
7. Other topics in previous years exams and covered in the slide:
 - a. Kernel trick
 - b. Empirical Risk Minimization
 - c. KKT conditions
 - d. Hinge loss
 - e. Slack variable & rescaling
 - f. K-means
 - g. Lagrangian multipliers
 - h. Kernels, RBF kernels, polynomial kernels
 - i. Regularization Theory
 - j. Representer Theorem