Pattern Classification and Machine Learning FEN3202

Discussion Agenda and

Exercises for Lecture 11

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I. DISCUSSION AGENDA

1) Mixture Models and EM (Chapter 9 of the text book).

   Discussion Points: An Alternative view of EM (section 9.3), equation 9.29, problem of sum and logarithm, Assumption: maximization of complete data Log-likelihood is easy, General EM algorithm, equation 9.32-9.34, discussing more on equation 9.33, what happens for MAP?

   Gaussian mixture revisited (section 9.3.1), equation 9.35-9.36 (note the sum and logarithm use), comment: the solution of General EM is same as standard EM for Gaussian mixture.

   The EM algorithm in general (section 9.4), equation 9.69-9.72

   Elaborate understanding of equation 9.70 and Figures 9.11, 9.12 and 9.13, equation 9.74

   What happens for MAP? equation 9.76 and 9.77

2) Approximate Infererence (Chapter 10 of the text book).

   Discussion Points: Motivation, stochastic and deterministic approximations

   Variational inference (section 10.1), equation 10.2-10.4

   Factorized distributions (section 10.1.1), equation 10.5, mean field theory, equation 10.6 to 10.9, consistent solution of equation 10.9 (or distributions of latent variables).

II. ASSIGNMENT

1) Exercise 9.4 (related to EM for MAP)

2) Exercise 9.6 (related to one constrained example for EM applied to Gaussian mixture)

3) Exercise 9.7, 9.8 and 9.9 (To show equivalence between general EM and standard EM for Gaussian mixture)