computer_project3

October 17, 2019

ECE 581K Computer Project 3 (Due Oct 23th 2pm 2019)

Question 1.1: Simulate 8000 IID oberservation $x_1, x_2, \cdots, x_N$ from a Gaussian Mixture Model with mean $\mu_1 = 3, \mu_2 = -1$, STD $\sigma_1 = 2, \sigma_2 = 0.8$ and $\alpha_1 = 0.25, \alpha_2 = 0.75$, and plot the histogram of X

Question 1.2: Use the EM algorithm to derive the parameters $\mu_1, \mu_2, \sigma_1, \sigma_2, \alpha_1, \alpha_2$, plot the log-likelihood against the number of iterations and plot the estimated density of X

Question 1.3: Use the Kernal Density Estimation method in lecture10_2.pdf to derive the density of X. Plot it and compare with the plot derived by EM.

Question 2.1: Simulate 2000 IID oberservation $x_1, x_2, \cdots, x_N$ from a Gaussian Mixture Model with mean $\mu_1 = [-0.5, 0.5]^T, \mu_2 = [5.5, 1.5]^T, \mu_3 = [1, 4]^T$, Covariance $\Sigma_1 = [[2.0, 0.3], [0.3, 0.5]], \Sigma_2 = [[4.0, 0.3], [0.3, 0.5]], \Sigma_3 = [1, 4], [[6.0, 1], [1, 2]]$ and $\alpha_1 = 0.2, \alpha_2 = 0.3, \alpha_3 = 0.5$, and draw the scatter plot of X

Question 2.2: Use the EM algorithm to derive the parameters $\mu_1, \mu_2, \mu_3, \Sigma_1, \Sigma_2, \Sigma_3, \alpha_1, \alpha_2, \alpha_3$, plot the log-likelihood against the number of iterations