Lab Assignment - 3

Instructor : Dr. Arabin Kumar Dey

1 Due date:

- 21/8/2019 midnight.

2 Notes:

- Submit the codes in all R / S-plus corresponding to the questions.
- Make a proper documentation preferably in latex or using some other software and submit the printout of the report in .pdf form.
- Each student needs to write his/ her own solutions, even though discussions of the assignments between students are encouraged.

3 Assignments:

(a) Generate 200 random samples from the following mixture distribution $f(x)$. Let's assume $f(x) = 0.4f_1(x; 0, 1) + 0.6f_2(x; 0, 25)$, where $f_1(x, \mu_1, \sigma_1^2)$ and $f_2(x, \mu_2, \sigma_2^2)$ are two normal distributions with means μ_1 and μ_2 and variance σ_1^2 and σ_2^2 respectively.

(b) Use the above data to estimate the parameters of mixture of two normal distributions by EM algorithm. Verify your result. Use both your own code and in-built function sepa-

rately. Use the data set in Assignment 2 to fit the data set with mixture normal distribution. Comment on the goodness of fit based on graphical diagnostics.

(c) Generate 100 sample (say $y_1, y_2, \cdots, y_n$ from N(0, 5)). Assume $y_1, y_2, \cdots, y_n|\sigma^2 \sim N(0, \sigma^2)$ where σ^2 is unknown and also assume a prior on σ^2 as $p(\sigma^2) \propto (\sigma^2)^{-\frac{5}{2}-1} e^{-\frac{1}{2\sigma^2}}$. Show that the posterior of σ^2 based on above sample is also Inverse gamma distribution. What are the parameters ? Find bayes estimate and MAP estimator for σ^2.