SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

51.504 Machine Learning, Fall 2018

Assignment 3

Last update: Tuesday 16th October, 2018 10:34

Grading Policy and Due Date

- You are required to submit: 1) a report that summarizes your experimental results and findings, based on each of the following question asked; 2) your implementation (source code) of the algorithms.
- You are free to choose any programming language you prefer.
- Submit your assignment report and code to eDimension.
- This assignment is an individual assignment. Discussions amongst yourselves are allowed and encouraged, but you should write your own code and report.
- Submit your assignment to the eDimension by 11:59 PM on Sunday 28 October 2018. Late submissions will be heavily penalized (20% deduction per day).

1 Task: Mixture of Gaussians & EM

1. (1 pt) Assume we have two spherical Gaussians. For the first Gaussian, the mean is $(1, 1)$, and standard deviation is 1. For the second Gaussian, the mean is $(0, 4)$, and standard deviation is 2. Please generate 100 2-D points for the first Gaussian, and 50 points for the second Gaussian, and plot them in one figure.
2. (2 pt) Now, given the 150 points, implement the K-means algorithm discussed in class and partition the 150 points into 2 clusters. Compute the cluster centers and the standard deviation of each cluster. Discuss how you initialize the model and when to terminate the iterations.
3. (2 pt) Now, instead of using the K-means algorithm, let us use the soft EM algorithm. You could use the cluster centers and deviations calculated by K-means as initialization for the two Gaussians in EM. Compute the parameters for the two Gaussians. Discuss how you initialize the model and when to terminate.