ASSIGNMENT 4
DUE DATE: Tuesday 30 October, 2012 11:59 PM

In this assignment you will implement the reconstruction algorithm discussed in Lecture 8 (slide 22). You will also perform a comprehensive assessment of the performance of the algorithm and present it in the form of a paper.

The assignment will contribute 10 points to your final grade, but will be graded out of 100 points. You may use one of R, Matlab, C or Java to implement the algorithm.

Performance assessment

You should test your implementation on at least five different distributions for the original data. Use a Gaussian distribution for the noise data. Your experiments should explore the following aspects of the algorithm:

1. reconstruction quality when data comes from different distributions (you must test at least five)
2. impact of the amount of noise (set using the mean and variance of the Gaussian noise function) on the reconstruction quality
3. impact of data size (number of samples you have)
4. impact of interval length
5. impact of the number of iterations (the algorithm suggests the use of a statistical test to stop the algorithm; for this assignment, set the number of iterations manually in order to observe its impact)

For each experiment, make a plot similar to the one below. The original data (20000 samples) in this experiment came from a mixture of two Gaussian distributions. The noise came from a Gaussian distribution with zero mean and unit variance. The interval size is 0.2. The R code for the data generation is as follows:

```
# Original data
x <- c(rnorm(10000,mean=-1,sd=0.5),rnorm(10000,mean=1,sd=0.25))
# Noise data
y <- rnorm(20000,mean=0,sd=1)
# Perturbed data
w <- x+y
```

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![Graph example](image-url)
Write-up

Include the following in the write up.

• Algorithm: a brief description of the implemented algorithm
• Experiments: description of what experiments you performed to do the assessment
• Results and discussion: plots and discussion on your assessment of the algorithm

Grading and submission

The 100 points will be distributed as follows: correct implementation – 40; comprehensive experiments – 20; discussion – 30; source code documentation – 10. Submit the source code and the write-up in blackboard by the stated deadline.

You must work alone in this assignment. It is okay to discuss the algorithm with your peers, but the programming must be done individually.