**Homework 05b**

1. What is the pseudo-distribution (mixture distribution) for this range data? (Hint. Use the EM algorithm, which we will discuss in Lecture 6. Use the four un-truncated distributions we will discuss in class. Use the mean computed in 1.d above for z\*. Lump all out- of- range measurements in the 40 meter bin)? (5 points)

Solution:

Read in data

Append all raw data measurements over 40m to be 40m

The combined Mixture Model without noise

Which is the probability of getting a particular measurement, zt, given the wall location, xt, and the number of measurements, m.

To satisfy the second part I started with

The Narrow Uniform Distribution is used for both p0 and p3, the minimum and maximum range measurements respectively.

The Full Gaussian Distribution is used for p1, the wall measurement.

For starting values, we use:

as the mean of the wall measurements without other objects, min range measurements, and out of range measurements.

as the Standard Deviation of the above-mentioned wall measurements.

From Question 1c we know.

The Full Exponential Distribution is used for p2, the unexpected near objects.

Expectation

Find new

Where m is the number of measurements.

Maximization

Find new and

Iterate Expectation and Maximization steps until stopping conditions are met. Save current as respectively. The given Stopping Conditions are an example you can change as necessary for your purposes.

Print error message if 1000 iterations is reached

Print final

Create z vector that is 0 to 4000 in increments of 1

Create p vector that uses the appropriate probability equation or combination of equations and weight(s) for the range the corresponding z is found in.

Graph p vector vs z vector

