Exercises (Assigned on Week 8)

1. Suppose that I don't know how many clusters I should use. What are my options (think in terms of our existing algorithms).

2. We said that in the Neural Gas routine, when a point $\mathbf{x}$ is chosen, the centers are updated in such a way as to move towards $\mathbf{x}$. What was the formula to do this? In particular, analyze each part of the formula, and include a sketch that generally describes the roles of the learning parameters ϵ and λ.

3. Matlab Exercise: Consider the following 2×2 cell array:

$$A = \left\{ \begin{array}{cc} \text{'Matlab'} & \text{'Word 2'} \\ \begin{bmatrix} 3 & 9 \\ 8 & 2 \end{bmatrix} & \begin{bmatrix} 2 \\ 5 \\ 8 \end{bmatrix} \end{array} \right\}$$

   Write a script file that answers the following questions:

   (a) Create the cell array (and store in the variable A).
   (b) Give the Matlab command that would access the number 8 in the matrix, then in the vector.
   (c) Give the Matlab command that returns the character 'l' in "Matlab".

4. We can construct an array of structures. For example, suppose I have the following table:

Name	Job	HR Num
Doug	Gopher	379
Loren	Developer	2
Jiro	Computer Spec	967

   We want to create an array of structures called `people`. The structures in `people` will be `name`, `job`, `num`. For example,

   ```
   people(1).name='Doug';
   ```

   Write a script file that answers the following:

   (a) Finish defining the array of 3 structures in the variable `people`.
   (b) How would you access the letter g in `Doug` (using the array of structures)?
   (c) Write the following code fragment in your script. If your structure is defined correctly, the code should work without error.

   ```
   for j=1:3
      fprintf('The name of employee %d is %s\n',people(j).num, people(j).name);
   end
   ```

5. Answer the homework question about determining the line of best fit.