COMS 3101 - Fall 2013
Homework 4

- Due by start of class (Monday 4pm).
- See submission instructions.

1.

a) Write a function named 'hw4a' which has one input parameter ('specs') and one output parameter ('ret_line'). Your function should do the following:

b) Suppose 'specs' is a struct with 4 fields: {file_dir, file_name, nlines, my_line}. Use if-end or if-elseif-end statements to check that:
    1. 'specs' is indeed a struct.
    2. The four fields above all exist.
    3. The fields 'file_dir', 'file_name' are (non-empty) strings
    4. The fields 'nlines', 'my_line' are positive integers.

c) Now suppose you have a directory whose name is stored in 'specs.file_dir' which contains a file whose name is stored in 'specs.file_name'. You should assume that you have a simple text file which contains text (NOT numeric data).

d) Your function should open the file (hint: use fopen), and read 'specs.nlines' number of lines (rows) from the file into a cell array C. Each element of C should contain one line from your file. You can assume that there are no errors in the parameter 'specs.nlines', that is, it cannot exceed the number of lines in your file.

e) Suppose, 'specs.my_line' specifies some line number. The output parameter 'ret_line' should be set to this line (you should return a string).

f) Verify that your code works by saving some text into a file (created in notepad / textedit) and saving the file with extension '.txt'. You should attach the file with your code.

   NOTE: make sure to review the solutions to HW#3, and correct your previous errors, if any.

NOTE: don't forget to check whether the file was opened properly and close the file after reading from it.

2.

a) Write a function named 'hw4b' which has 3 input parameters {M, THR, C} Your function should do the following:
b) Suppose M is a matrix with 3 columns. Columns {1,2} of M are the {x,y} coordinates of points in the plane. Column 3 is the 'strength' of the point; it is a positive real value in some (unknown) range.
c) Suppose 'THR' & 'C' are cell arrays (one-column arrays). Each element of THR is a two-element vector. For example, THR{1} = [1.5,3.5]. For each element of THR choose only the points (rows) of M whose strength (column 3) is in the range specified by the vector. For example, choose row k of M if 1.5 <= M(k,3) <= 3.5.
d) Now suppose C has the same size as THR, and each element of C is a string that indicates how the relevant points (rows) of M should be plotted. For example, C{1} = 'r.' means plot red dots, where the points are selected based on the range specified in THR{1}.
e) Your function should plot the selected points (from part c,d), according to the setting in array C. You can assume that the setting is legal (no errors). All your selected points should be plotted on the same figure (but with different colors/markers).
Note: you don't need to do error checking.
Note: you can test your function by generating some random data (using 'rand' for example).

3.

a) Write a function named 'hw4c' which is almost identical to 'hw4b'. The only differences are:
    1. You have one input parameter (a struct) that contains 3 fields: {M,THR, C}.
    2. The range in each element of the cell array THR, is a subset of [0.0,1.0]. For example THR{1} = [0.3,0.4]. Normalize your data so that the strength of every point is between 0.0 and 1.0, before you start selecting points.

b) Your function should work. In other words, you'd have to adjust your code to account for the 1st difference.