Islamic University of Technology (IUT)

Organization of Islamic Cooperation (OIC)

Department of Electrical and Electronic Engineering (EEE)

EEE 4416: Simulation Lab
Lab – 09 Assignment

Exercise - 01

Import the file named **'cirrhosis.csv'** into your MATLAB and perform a **detailed Exploratory Data Analysis (EDA)** task for that data. Use **proper visualization** techniques to illustrate different feature variables.

- ⇨ Explore the sample EDA provided for the **'fatal police shootings'** dataset.

Exercise - 02

Import the file named '**BigML_Dataset.csv'** into your MATLAB. You performed several tasks on this dataset in last week's assignment. Now, try to use different visualization techniques to express the findings.

Exercise - 03

Create a GIF file of **'unarmed' police shootings** over the years. There is a column that contains information on whether the victim was armed or unarmed. Extract the records of unarmed cases first, then plot the figures. ['fatal police shootings' dataset]

Exercise - 04

Create a video file plotting a **balanced 3-phase sinusoid** in the time domain and showing its resultant (space) vector. A sample video is attached.

Exercise - 05

In the '**weather data'**, with respect to time, variables change. Create a (m x 2) subplot displaying how the variables change with respect to time. Create a .gif file showing progression over time.

Exercise - 06

In the **'worldcities'** dataset, create a geographical plot that shows only the cities of a particular country/countries whose name starts with your first name.

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For instance, if your name is – 'Bruce', select only those countries whose name starts with the letter 'B' (such as Bangladesh, Bahrain, Belgium, etc.). Don't hardcode – write a **function** that will extract a sub-table of cities starting with a particular letter matching your name (input parameter).

Change the size of the bubbles of the cities based on population size. So, a city like Tokyo should have a larger bubble compared to a smaller city.

Exercise - 07

Problem statement: Symmetric Pair

Given an (n, 2) matrix, write a function that removes any symmetric pairs (also duplicates) from the matrix. Keep the first occurrence only. (2, 3) and (3, 2) are considered symmetric pairs.

For example,

x = [1,2;

2,1;

3,2;

4,3]

Here, the 1st and 2nd row is a symmetric pair => (1,2) and (2,1). Keeping the first occurrence, the output should be -

out = [1,2;

3,2;

4,3]

Test Case – 01:

- Input: [1,2; 2,1]
- Output: [1,2]

Test Case – 02:

- Input: [1,2; 2,1; 2,1]
- Output: [1,2]

Test Case – 03:

- Input: [1,2; 2,1; 1,2; 2,1]
- Output: [1,2]

Test Case – 04:

- Input: [1,2; 2,1; 3,2; 4,3; 1,2;2,1;2,1;3,4]
- Output: [1,2; 3,2; 4,3]

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Exercise – 08

Problem statement: Longest common subsequence.

Given two sequences, write a function that returns the length of the longest common subsequence.

a= [1,1,1,1,1,2,3,1,4]

b= [2,3,0,0,9,5,4,1]

longest Common subsequence = [2,3,4]

= [2,3,1]

so, length=3

Test Case – 01:

- Input: [1,1,1,1,1,2,3], [2,3,0,0,9,5,4,1]
- Output: 2

Test Case – 02:

- Input: [1,1,1,1,1,2,3,1,4], [zeros(1,50),ones(1,200),ones(1,20)*3]
- Output: 6

Test Case – 03:

- Input: 'aaabbbcccxyz', 'abcyycbaabc'
- Output: 5

Test Case – 04:

- Input: [1,1,1,1,1,2,3,1,4], zeros(1,500)
- Output: 0

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Exercise – 09

Problem statement: Abelian Sandpile

Generate a matrix like an abelian sandpile where the center of the matrix is n. For example, n=3

```
out=[0     0     0     0     0     0     0
     0     1     1     1     1     1     0
     0     1     2     2     2     1     0
     0     1     2     3     2     1     0
     0     1     2     2     2     1     0
     0     1     1     1     1     1     0
     0     0     0     0     0     0     0]
```

Test Case:

- Input: 5
- Output:

```
[0     0     0     0     0     0     0     0     0     0     0
 0     1     1     1     1     1     1     1     1     1     0
 0     1     2     2     2     2     2     2     2     1     0
 0     1     2     3     3     3     3     3     2     1     0
 0     1     2     3     4     4     4     3     2     1     0
 0     1     2     3     4     5     4     3     2     1     0
 0     1     2     3     4     4     4     3     2     1     0
 0     1     2     3     3     3     3     3     2     1     0
 0     1     2     2     2     2     2     2     2     1     0
 0     1     1     1     1     1     1     1     1     1     0
 0     0     0     0     0     0     0     0     0     0     0]
```


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