

Assignment 3

CPS 563 - Data Visualization

Released Date: 03/26/2022

Requirements

In this assignment, you will solve practical and interesting problems in data visualization. The problems will gain valuable hands-on experience in data manipulation, data visualization, algorithm design and implementation.

Problem Description

You are provided the “**places.zip**” file with two folders “**Images**”, “**Test**” and “**spider_plot**” function after the file decompression. Each image in the two folders is in jpg format.

- a. You resize all images in both folder to the size of 64x64 and convert them to grayscale images (hint: use `imresize` and `rgb2gray` functions).
- b. For each resized image (64x64) in the “**Test**” folder, you plot the test image with the most similar image in the “**Images**” folder (hint: you concatenate all image pixels to form 4096-dimension feature for each image. Then you compute the distance between each test image and all “**Images**” images. Next, you plot the “**Images**” image with the smallest distance to the test image).
- c. For all resized images (64x64) in the “**Images**” folder, you are required to perform Principal Component Analysis (PCA). Visualize the first **20 eigenvectors** obtained from PCA (hint: use `subplot` function in MATLAB).
- d. You use 20 eigenvectors obtained from **Question c** to project all resized images (64x64) in the “**Images**” and “**Test**” folders to 20-dimension space. In 20-dimension space, you are asked to plot each test image with the most similar image in the “**Images**” folder (hint: Here each image

has 20-dimension feature after PCA. Then you compute the distance between each test image and all **Images** images. Finally, you plot the **Images** image with the smallest distance to the test image).

- e. For each resized image (64x64) in the “**Test**” folder, you project it to principal components obtained from PCA (in **Question c**), and then you utilize Radar Chart (hint: you use the given `spider_plot` function), to visualize all images in the “**Test**” folder with the first 5 components.

What to Submit

1. You must submit your program source code that implements the problems in the Assignment 3.
2. A well-written, concise project report. It should include: (a) title and names of group members; (b) the analysis of each problem; (c) the issues during the implementation; (d) the solutions to overcome the issues in (c); (e) the contribution of each individual member.
3. The powerpoint slides (**maximum 10 slides**) used in the Assignment grading.

For each group, you must submit the files above in a single zipped folder named after your student IDs.

Note: If you cannot submit zipped file to isidore, please change the filename extension from .zip to . doc or .docx or .z1 and then submit it

Submission Due: 11:55pm, April 24, 2022