Digital Image Processing **Homework 4**

Prof. S. Kasaei **Deadline 3 Khordad**

Please make a zip file named HW4_stdno_lastname and upload in cw. Feel free to contact me (aryansadeghi1374@gmail.com) if you have any questions.

If a question asks you to run the code on image(s), please save your results in a folder or leave them in Jupiter notebook file.

1. Edge Detection (15)

1. Implement Sobel filter and apply it on Boxes.png
2. Implement Canny Edge detector.
3. Apply both filter on cube.png and compare the results.

2. Template Matching (15 + 10)

1. Complete template_matching.ipynb. (you can use libraries for this part)

   * extra points for implementation from scratch.

3. Shape Matching using Hu Moments (15)

Load images in Numbers' folder. There are 2 images of each number. Rotate each image such for every number there are at least two rotated images. Using HuMoments in skimage or opencv and match the images and rotated ones for each number. Show the results.

4. Image Classification (30 + 5)

In this part we want to classify MNIST dataset. report accuracy on train and test sets for each part. In the end Compare the results .

1. Use the SVM classifier on this dataset and
2. This time use K-Means algorithm to classify MNIST dataset.
3. Apply K Nearest Neighbor classifier on MNIST.

4. (extra) Use Neural Network model like MLP or CNN. (use Pytorch, TensorFlow or keras)

5. Thinning (25)

Implement below algorithms and apply them on thinning.png.

1. Medial axis transform.
2. Distance transform for skeletonized.
3. Now use python libraries and compare the results with previous parts.