Computer Vision HW #3 (due 2 June 2022)

You are given an image manipulation package in Visual ++.

The main file K-means.cpp will let you know how to load an image, change pixel values, and save the resulting image. Just compile the package, and observe how the input image "KU.raw" is changed to output images "Out1.raw" and "Out2.raw" by the simple function pixel(x,y).

To view the images in raw files, you may download a simple image viewer from
http://www.irfanview.com/

1) Using the package, design the K-means algorithm to cluster 1-dimensional pixel values. After clustering, assign each cluster with the average gray level. There are three input images in the main directory:

   KU.raw (720x560 image, each pixel is an 8-bit number)
   Gundam.raw (600x600 image, each pixel is an 8-bit number)
   Golf.raw (800x540 image, each pixel is an 8-bit number)

   Apply the K-means method to each image with the number of clusters = 2, 4, or 8, respectively. At each iteration, observe the cost.

   Report the resulting image with the printed cpp file.

2) Perform the EM algorithm to segment each image with the number of clusters = 2, 4, or 8, respectively. After clustering, assign each cluster with the average gray level.

   Describe the final converged parameters, i.e. mixing probability, mean, and variance of each Gaussian parameters.

   Report the resulting images with the printed cpp file.

If you are more comfortable with other languages like Matlab, you may use them instead of C++.