Clustering with the k-Means Algorithm

Laboratory 5, DEDP

Objective

Implement and use the k-Means algorithm for color-based segmentation of images.

Theoretical aspects

The k-Means algorithm

Look it up on the web :)

I'll explain it at the whiteboard.

Exercises

Pixel-based clustering

1. Load the color image 'image.jpg' using `imread()`. Convert the image to `double` and display it (don't convert to grayscale, leave the colors).
2. Use Matlab's k-Means algorithm to cluster all the pixel values (each pixel = a group of three values R, G, B) into 4 groups.
3. Replace each pixel of the image with the *centroid* of its class. Display the image. How does it look?
4. Change the number of clusters from 2 to 13 and display them in single window with `subplot()`.

TODO:

- make background of `flower.bmp` image lighter/darker/different color
- replace background of an image with background from another image

Vector quantization

1. Repeat process but cluster now a group of pixels:
    - Convert each 2×2 block of pixels into a single vector with 12 values.
    - Perform clustering on these 12-values data
    - Replace each group of 2×2 pixels with each centroid and plot the result.

Final questions

1. Suppose we do exercises 1 - 3 on a grayscale image. How will it look?