University of Hacettepe

BBM 415

Image Processing Laboratory

Problem Set 5

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Introduction

Clustering can be considered the most important unsupervised learning problem; so, as every other problem of this kind, it deals with finding a structure in a collection of unlabeled data. A loose definition of clustering could be the process of organizing objects into groups whose members are similar in some way. A cluster is therefore a collection of objects which are similar between them and are dissimilar to the objects belonging to other clusters. Feature is point of interest for image description.

1 Pixel Level Features

Two different features for each pixel in the image obtained; RGB colors feature and spatial location feature in a vector like [R G B x y]. It was used for the K-means clustering. Color and location values have different range of numbers.Special attention was paid for it.

2 Superpixel Level Features

2.1 Problem Definition

2.2 Solution

2.2.1 Laplacian Pyramid

2.2.2 Steps

2.2.3 Matlab Application

Halfing images

2.2.4 Inputs Outputs

2.3 Effects of Parameters

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3 K-means Clustering

K-means clustering is the easiest way to fix clustering problem. The main idea is to define k field, one for each cluster.

Steps for K-means Clustering

1. Place randomly K points into the space represented by the objects that are being clustered. These points represent initial group fields.
2. Assign each object to the group that has the closest field.
3. When all objects have been assigned, recalculate the positions of the K field.
4. Repeat Steps 2 and 3 until no more longer move..

3.1 Solution

3.1.1 Implemetation of Notch Filter

References

[1] `https://en.wikipedia.org/wiki/Pyramid_(image_processing)`