Computer Vision

Exercises of Lab 13

Exercise 13.1: Salient Object Segmentation

The goal of this exercise is to understand the principles behind graph-based image segmentation and use it to perform salient object segmentation. In this exercise we will use images from the DUT-OMRON dataset. A subset of this dataset is included in the files of this exercise. You can find more publicly available salient object segmentation databases here, here, here and here.

Make sure that you have PSE_functions package and change the variable PSE_pack to the unpacked path at your hard drive. This package is included in the files of this exercise (The package used for the formal evaluation of the method can be found in Alexandros' Iosifidis code list – direct link here).

Make also sure that you have downloaded the images included in this package and change the variable path_IM to the corresponding directory at your hard drive. You can also copy other images that you want to test for finding their salient regions in this folder.

Open Exercise13.1a.m and read the code. On line 54 you are asked to calculate the graph affinity matrix using the Heat kernel function. After adding these lines of code, run the Matlab script and inspect the saliency maps stored in the directory saliency_maps. Change the number of super-pixels in line 43 in different values and compare the resulting saliency maps. You can use the values {300, 600, 1200}.

Open Exercise13.1b.m and read the code. In this script we use three resolutions for image over-segmentation using the SLIC algorithm. After calculating the saliency maps for each super-pixel resolution, the average saliency map is calculated. On line 60 you are asked to calculate the graph affinity matrix using the Heat kernel function. After adding these lines of code, run the Matlab script and inspect the saliency maps stored in the directory saliency_maps. Compare the saliency maps obtained by using single-resolution and multiple resolutions. Which case is better?

Open Exercise13.1c.m and read the code. In this script we also use three resolutions for image over-segmentation using the SLIC algorithm. After calculating the saliency maps for each super-pixel resolution, the average saliency map is calculated. On line 59 you are asked to calculate the graph affinity matrix using the DistFind() function included in the PSE_pack. After adding these lines of code, run the Matlab script and inspect the saliency maps stored in the directory saliency_maps. Compare the saliency maps obtained by using the Heat kernel function and the new affinity calculation function. Which case is better?

Exercise 13.2: Supervised Salient Object Segmentation

The goal of this exercise is to compare (in a qualitative manner) the performance of unsupervised salient object segmentation methods (used in Exercise 13.1) with that of supervised-based salient object segmentation. For this purpose, we will use a method using a Convolutional Kernel Network combined with Extended Quantum Cuts saliency segmentation method.

Make sure that you have CKN-EQCut_functions package and change the variable CKNEQCut_pack to the unpacked path at your hard drive. This package is included in the files of this exercise (The package used for the formal evaluation of the method can be found in Alexandros' Iosifidis code list – direct link here).

Open Exercise13.2.m and read the code. In this script we also use three supervised saliency segmentation models (each performing on a different image over-segmentation resolution) and the SLIC algorithm. After calculating the saliency maps for each super-pixel resolution, the average saliency map is calculated. Run the Matlab script and inspect the saliency maps stored in the directory saliency_maps. Compare the saliency maps obtained by using the unsupervised approach (Exercise 13.1) and the supervised one. Which case is better?