Assignment 1: Feature extraction and matching

gponti

November 2023

1 Mean Shift

My implementation of Mean Shift algorithm was just filling the functions given in the skeleton:

1. The function `distance` just computes the distance between the given points and all other points in the set.
   The window is just set to all the points.

2. The function `gaussian` simply computes the weight with the Gaussian kernel function with respect to the distance.

3. In `update_point` we compute the weighted mean for every point with respect to the weights.

4. In `step` we just repeat the above 3 steps for every point in the image and update the image.

After trying with different bandwidths I reached different segmentation results: With bandwidth 1, the code seems to return an `IndexOutOfBounds` when looking for a color of the label.
Probably there are too many clusters centroids.
The best segmentation is with bandwidth 3.
With bandwidth 5 and 7 there are just too few centroids and part of the image that should be separated are merged in the same segment.
In the next page you can see the results:

Figure 1: Segmentation with $\sigma = 3$

Figure 2: Segmentation with $\sigma = 5$

Figure 3: Segmentation with $\sigma = 7$