CV2015Spring—Assignment #1

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1. The framework of the implementation.

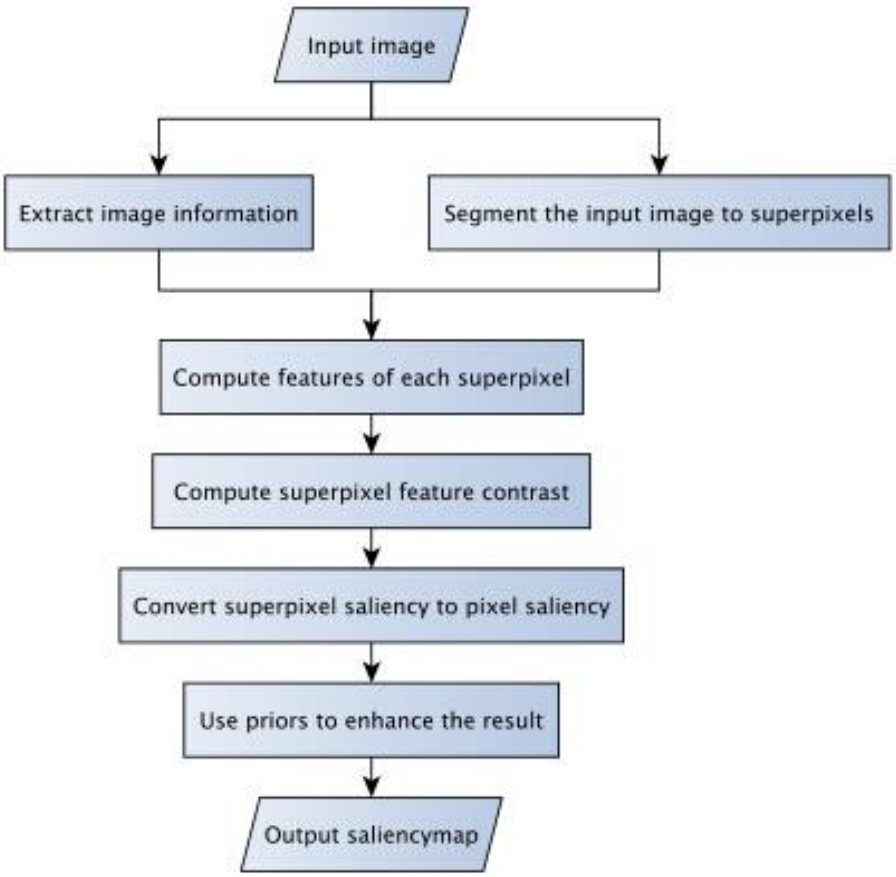

Figure 1. Framework of salient object detection.

2. The explanation of strategy.

Step 2-1. Extract image information

In this step, I use color information. I quantize each color channel (RGB) from 256 to 32 to reduce the number of colors, then the number of color is reduced to 32×32×32=32768 . In order to create a bin for each color, I can use a number (1 ～ 32768) instead of (R, G, B) values to

represent a color uniquely.

So, input the color image (m×n×3 matrix), output m × n matrix.

Figure 2. The color image

Figure 3. The quantized image

Step 1-2. Segment the input image to superpixels

In this step, I use the SLIC algorithm to segment the color image, region size is 20, regularizer is 0.5, the segmented image is following:

Figure 4. Superpixel segmentation

Step 2: Compute features of each superpixel

I set two matrices (comp3 and co_hist) to store each superpixel's pixels and h histograms, h is the number of superpixels after segmentation.

Step 3: Compute superpixel feature contrast

Every superpixel was computed as its feature contrast of all the other superpixels in the image. The output is average value.

The formulation for histogram distance is as follows:

$$\chi^2(\mathbf{h}_1, \mathbf{h}_2) = \sum_{i=1}^{b} \frac{2(h_{1i} - h_{2i})^2}{h_{1i}}$$

Step 4: Convert superpixel saliency to pixel saliency

Assign all the pixels of the same superpixel the same saliency value. I quantize the superpixel global contrast to pixel contrast (0-255).

The initial saliency map is as follow:

Figure 5. Initial saliency map

Step 5: Use priors to enhance the result

I use center prior and color priors to enhance the result, the code references to SDSP.

Figure 6. Final saliency map