

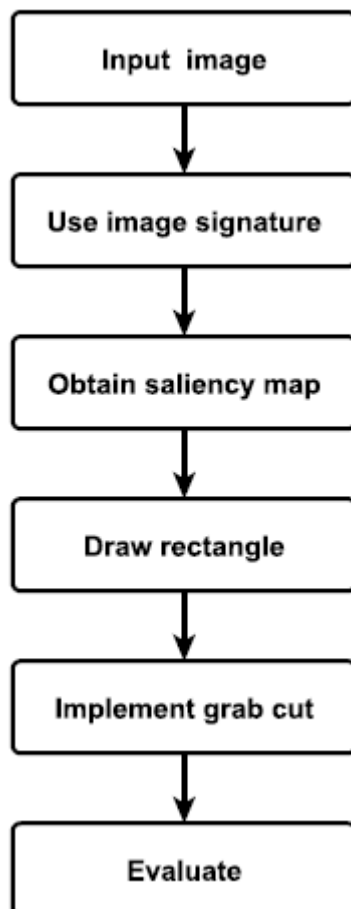
# Report on the assignment3

**Xue Chun**

For this assignment, I implemented segmentation through grab cut and meanshift.

## Grab Cut

Now,I will introduce the implementation and requirement of each part of the framework



## **Step1&2 Input image and use image signature**

In this step, I get the saliency maps of the input images by matlab. There are many steps.

Firstly, I create a file to save saliency maps using function `mkdir`.

Secondly, I use a for loop to batch process all of the images which is given in the assignment. When I process each image, I read in one image and use function `default_signature_param()` to generate default parameters.

Thirdly, I use function `signatureSal()` to get the initial saliency map and I use `imresize()` to ensure that the map have the same size as the input image. then I get the saliency map,

Finally, I use two for loops and one if...else to get the binary images of seven thresholds as the input of the next step and save this image.

## Step3&4 Draw the Rectangle&Implement Grab Cut



In this step, I use opencv to process images .The rectangle is used to locate the most probable position of object and initialize mask in grab cut. I use thresholding to transform saliency map to binary image and draw a rectangle according to the binary image. The size of rectangle is also adjustable. There are many steps.

Firstly, I use a for loop to process images of seven thresholds and use two strings to store the path of origin images and saliency maps.

Secondly, I use the function GetListFiles of class Directory to get all of the images stored in these paths and store their information in two string vectors.

Thirdly, I use one for loop to process images of each threshold with the

iterations of 3,4,5 and 6 in Grab Cut. I read in the origin image and saliency map and their length and height.

Finally, I use the program which is given to proceed Grab Cut ,save the final map and show which step is proceeding in the screen.

## **Step5 Evaluate segmentation result**

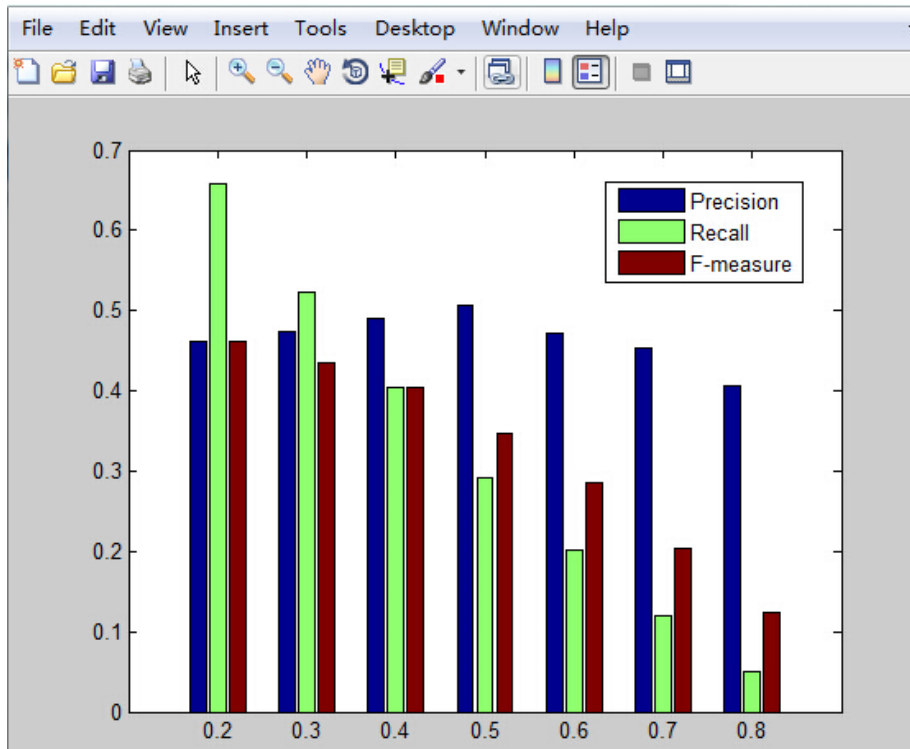
In this step, I use matlab to evaluate the outcome of Grab Cut. There are many steps.

Firstly, I generate a matrix to store the evaluation index of each threshold.

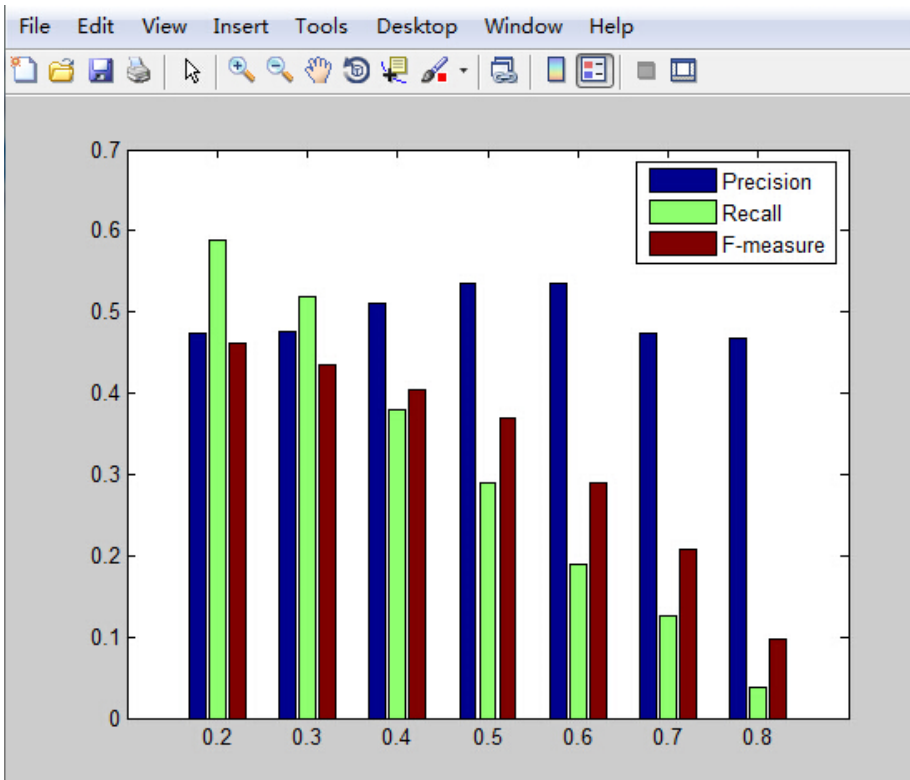
Secondly, I use two for loops to compute these indexes. I read in each final map and the groundtruth and change their types to double.

Tirdly, I use prfCount() to computer three indexes of each image and add them into the matrix.

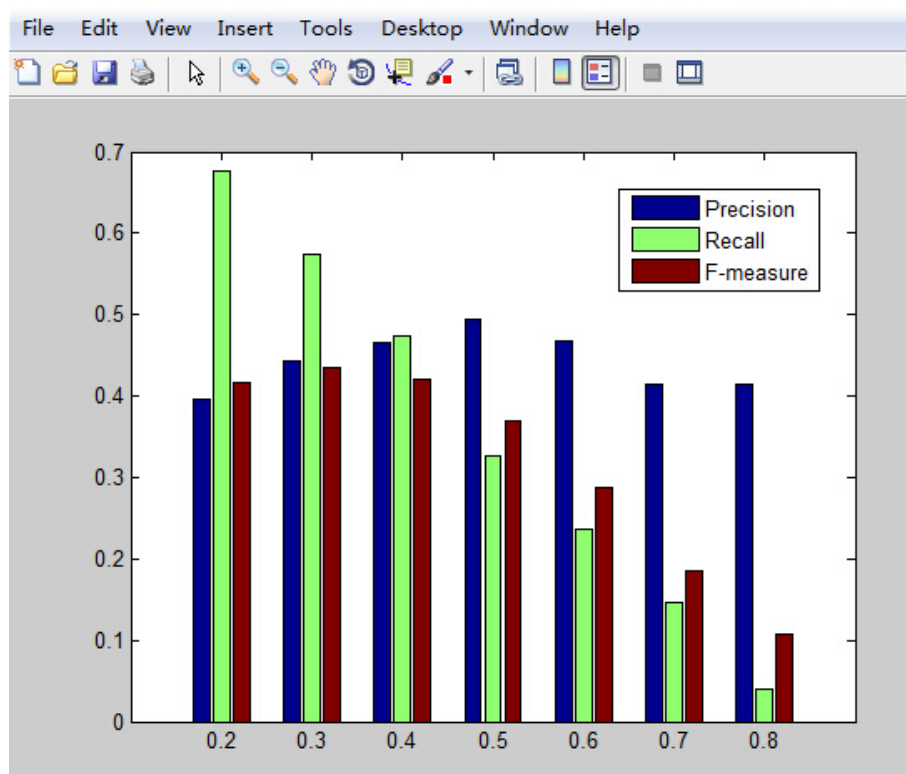
Finally, I computer the average indexes of each threshold and iteration and draw the bar charts.



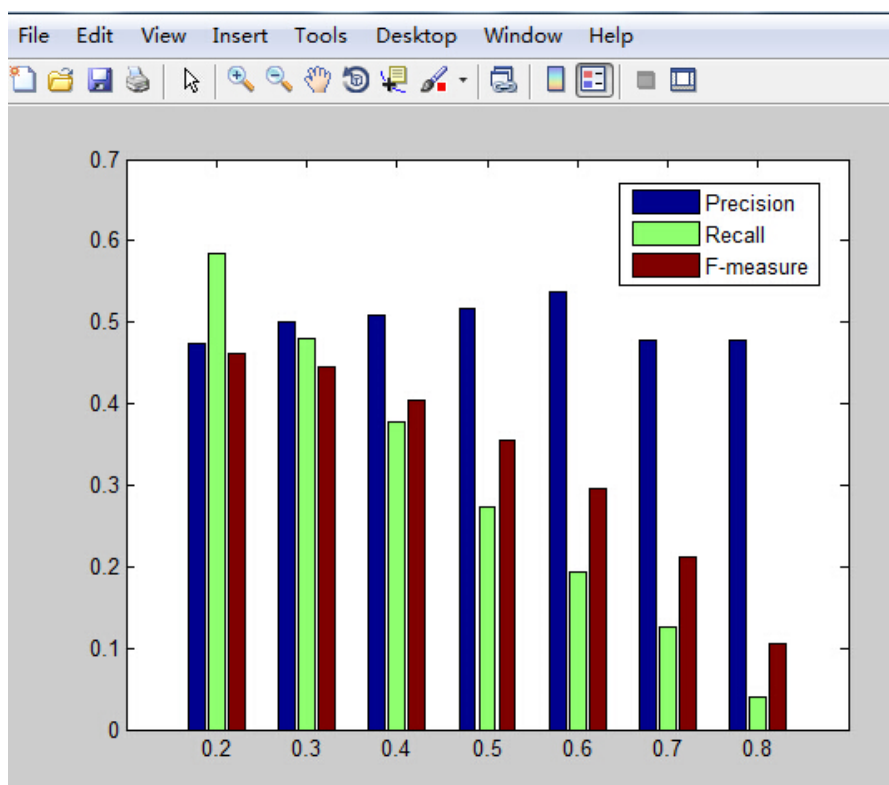
Evaluation chart when iteration=3



Evaluation chart when iteration=4



Evaluation chart when iteration=5



Evaluation chart when iteration=6

## Evaluation

The indexes of evaluation are precision, recall and Fmeasure. The larger indexes means that the outcomes are better. From the charts we can get the conclusion that if we proceed more iterations, we will get better segmentation. And when we set the threshold as 0.2 or 0.3, we will get the best segmentation, and the outcomes will become worse if we increase the threshold. Because of the limitation of time, I just choose fifty images as input when the iteration is 4,5 and 6, and from the charts we can see that if we take fewer images as input, the outcome is worse.

# Mean Shift

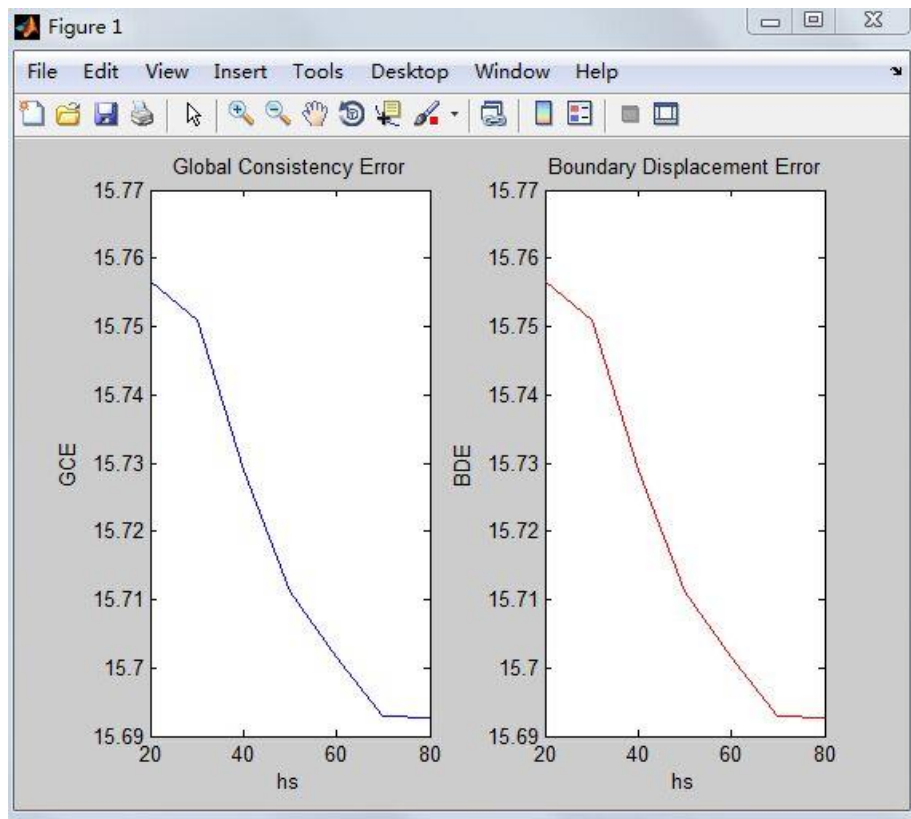
## Step1&2 Input image&Segment via mean shift

In this step, I use matlab to evaluate the outcome of mean shift . There are many steps. Firstly, I use two matrix to store the parameters of means shift and use one for loop to get the outcome with different parameters. And in the first loop, I fix hr as 10 and changes hs from 10 to 100; in the second loop, I fix hs as 40 and changes hr from 10 to 100. Without that I use function dir get all the images and mat files under two paths and store their information in Files1 and Files2. And I use one for loop to get the outcome of each images with every parameters. Then I use function processSuperpixelImage() to get the label maps and save them.

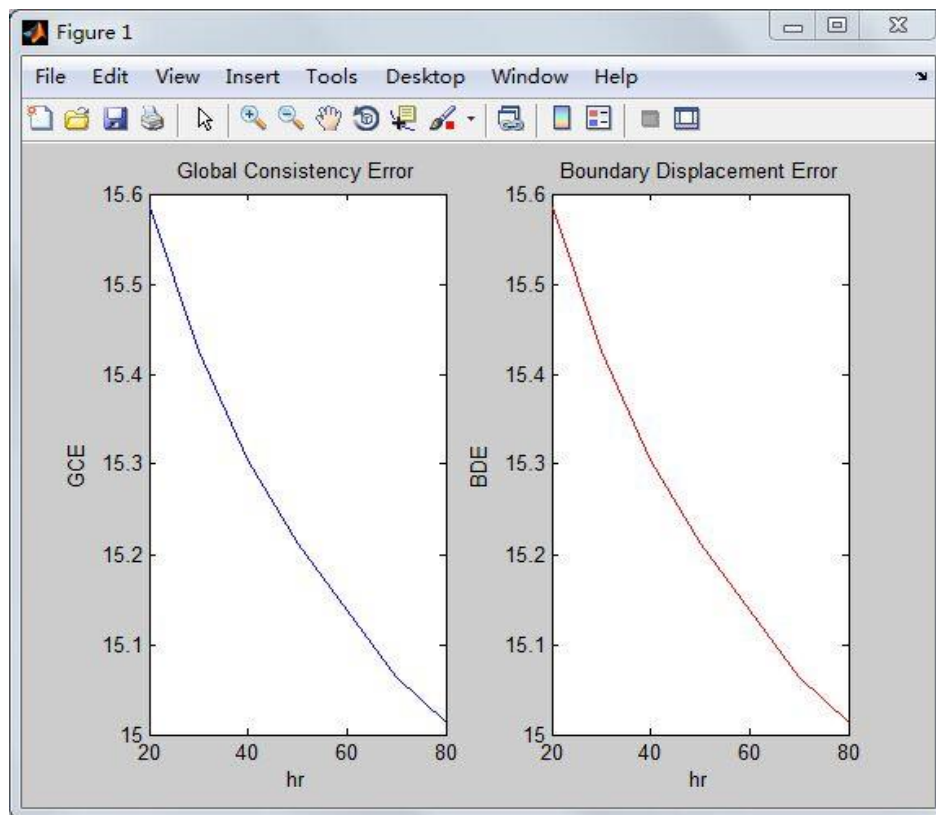
## Step3 Evaluate segmentation result with groundtruth

Firstly, I choose three string to store the paths of two segmentation output with different parameters and the path of groundTruth. Then I use one for loop to get the influence of hs and hr to the outcome of segmentation and use function EvaluationBatch to get the evaluation.





Evaluation with same  $h_r$  and different  $h_s$



Evaluation with same  $h_s$  and different  $h_r$