

## HW3

Note:

For each question, 10 points (2 points for algorithm description, 8 points for code implementation). The preliminary results are just for reference. Your program needs to be able to run directly, if you need to use other variables, please save it in advance. Please submit your homework to [spring2020cs270@163.com](mailto:spring2020cs270@163.com). With both subject and file name in this format. (CS270+ID+name+hw3) example, CS270\_2019123321\_张三\_hw3. DDL:2020/5/31



**Image segmentation** is the process of partitioning a digital image into multiple segments (sets of pixels, also known as image objects). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. The result of image segmentation is a set of segments that collectively cover the entire image. Given you a real color image named 'pepper.png' as follow. Any toolbox function in the matlab is free to use. But do not work it out directionally by interactive apps integrated in matlab.

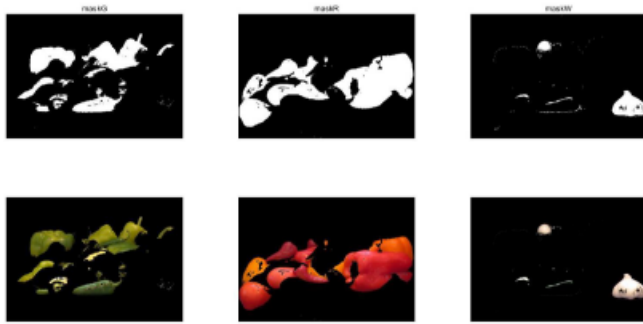
**Task:**

1. Please describe your algorithms in words or flowcharts.(2 scores)
2. Finding the segmentation line of foreground and background.(4 scores)
3. Classify the three type objects in the foreground: red peppers, green peppers and white garlics. (4 scores)



**Reference solution:**





**Graph-cut** is a useful and popular energy optimization algorithm, which is widely used in the field of image processing in front and rear background segmentation, stereo vision, image matting, etc.

In this assignment, you are required to implement a graph-cut algorithm to achieve up to 4 segments for a given image. You don't have to make this process interactive, but if you do so, you can call functions for the interactive part.

### Task:

1. Please describe your algorithms in words or flowcharts. (2')
2. Implement your own program to achieve multi-class image segmentation (up to 4 segments for a given image) via graph-cut approach.
  - 1) As shown in Figure 1, perform graph-cut to segment the image into foreground and background. (4')

**Attention:** Please use Pyy.jpg to test your program.



Figure 1

- 2) Run your multi-class implementation graph-cut to further segment the given image into 4 parts. Mark your segments with 1,2,3,4 and color coded: red, blue, green and yellow respectively and show your segments via transparently painting over the original image as in Figure 2. (4')

**Attention:** You can test your program using Pyy.jpg ,Xiaoxin.jpg or other images.



Figure 2