1. Consider you want to use the Hough transform to detect an ellipse in an image. What are the dimensions of the accumulator space? In other words, how many parameters you need to estimate? 1 point

- ○ 2
- ○ 4
- ◉ 5
- ○ 1

2. 1 point

Assume you have an image with a trimodal distribution, meaning you have 3 core pixel values (consider an histogram composed of 3 Gaussians). How would you use Otsu's method, designed only for bimodal distributions, to segment the image? Simply write your suggestion in the box below.

find two thresholds k1 and k2

10000 characters max.

3. Considering foreground/background segmentation via graph cuts, which one of the following is an appropriate function for the weights between nodes representing image pixels? 1 point

- ○ A function of the grey (or color) average of the connected pixels.
- ○ A function of the pixel's class.
- ○ A function of the area of the foreground object.
- ◉ A function of the grey (or color) difference between the pixels.

4. In the Mumford-Shah segmentation model, what would be a good measure to penalize for creating too many segments? 1 point

- ○ The area under the histogram curve.
- ◉ The total segments' boundary length.
- ○ The difference between that maximal and the minimal pixel value in each segment.
- ○ To maximal pixel value in the image.

5. How would you combine Otsu's algorithm with Mumford-Shah concepts to design a segmentation algorithm that considers both ideas simultaneously? 1 point

- ○ Bound the possible threshold solutions.
- ○ They are two incompatible algorithms and can't be combined.
- ◉ Add a length term to Otsu's algorithm penalty function and perform brute-force search for the optimal threshold that minimizes the new penalty.
- ○ First find the optimal threshold via Otsu's algorithm and then return both the threshold and the length of the detected segments.

6. The threshold computed by Otsu's method is unique. 1 point

- ○ Yes.
- ◉ No

7. Consider an image that is constant, with gray value A, except for a few straight lines of random orientation and length, but constant gray value B ($A \neq B$). Which technique/s can you use to segment all the pixels in the image into 2 groups, one for the background and one for the lines? 1 point

- ☑ Otsu's algorithm
- ☐ Wiener filtering
- ☑ Hough transform

8. What is the fundamental difference between simple thresholding and Otsu's algorithm? 1 point

- ○ Simple thresholding works only for multiple Gaussian distributions
- ○ Otsu's algorithm is faster
- ◉ Otsu's algorithm automatically computes the threshold
- ○ They are actually the same

9. The Hough transform can be used only for detecting straight lines, circles, and ellipses. 1 point

- ○ True
- ◉ False

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