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Assignment Discussion Lesson 12: Image Segmentation II

Question

1) What is convolution?

2) What is a mask or kernel?

3) Why do we need to do smoothing?

4) What is thresholding?

5) What is difference between low and high threshold?

Answers

1). Convolution is a mathematical operation on two functions (f and g). It produces a third giving the integral of the pointwise multiplication of the two functions as a function of the amount that one of the original functions is translated.

2). A mask or kernel is a small matrix used for blurring, sharpening, embossing, edge detection, and more. This is accomplished by doing a convolution between the kernel and an image. By use the formula such as:

$$\mathrm{I}_2(\mathrm{i},\mathrm{j}) = \sum_{k=0}^{2}\sum_{l=0}^{2} I_1(i+k-1, j-1)K(k,l)$$

Formula of Convolution operator with a mask or kernel K

3). We need to do smoothing because it helps maintain original image edges while removing noise, help reduce irregularities in time series data, and provide a clearer view of the true underlying behavior of the series.

4). Thresholding is the technique used to create a binary image from grayscale, and also can use to improve image edge detection by eliminating unclear or noise of edges detection image by only display the actual edges of the image.

5). The difference between low and high threshold such as:

- Low threshold: all edges are detected but we have false positives.

- High threshold: all the pixels detected are edge pixels but we are missing some of them (false negatives).