Scale Space Edge Detection

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Abstract

Scale space representation is the idea that a two dimensional image can be represented by a collection of smoothed images. This paper documents how using such a representation can be useful for detecting edges in an image. The scale space allows for a classification of how strong different edges are in the image from very fine to coarse ones.

1 Scale Space

To understand how exactly we detect images in the scale space, we must first define what the scale space is. If we have a continuous function of a variable such as $f(x)$, then we define the scale space representation of such a function as

$$L(x;t) = g(x;t) * f(x) \tag{1}$$

Here t represents the scale parameter, and can be thought of how much smoothing is applied to the function. The function g is the Gaussian kernel given by

$$g(x;t) = \frac{1}{2\pi t} e^{-(x^2+y^2)/(2t)} \tag{2}$$

References

31st Conference on Neural Information Processing Systems (NIPS 2017), Long Beach, CA, USA.