

Detecting edges using the Marr-Hildreth approach

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Abstract

Edge detection is an important task in the image processing field of computing science. It is one of the first steps to get a better understanding about the image. There are a lot of methods available out there for detecting edges, like the canny edge detector, Sobel and Prewitt methods. All these edge detectors detect edges by convolution on the digital image with a certain filter.

The Marr-Hildreth edge detection method uses the Laplacian filter of the Gaussian function to convolve the input image. This result is used to detect zero-crossings to obtain the edges. When the result of the Laplacian is plotted on a edge pixel we will see a curve that crosses the x and y axis, therefore it is called zero-crossings. We will use the Marr-Hildreth method for obtaining edge data which can be used for further processing steps, therefore we need data with an low-error rate.

We will give a description of the Marr-Hildreth algorithm after which we will research its performance comparing it to the Berkely Segmentation Dataset (BSDS), which is a set of images where human individuals have marked edges as comparison material. We will discuss the results obtained from this research.

Keywords:Marr-Hildreth, edge detection, image processing

Topic:Marr-Hildreth edge detector

Field of research:Image Processing

Focus/research questions:How can we detect edges using the Marr-Hildreth edge detector and how well does it perform, comparing to the Berkely Segmentation Dataset (BSDS)?

Expected findings/results:Edge detecting is a non-trivial task, noise will cause errors in our detection. Also the quality and color of the image will have influence on the results. In the end it will be very hard to say if the result is satisfied.