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Abstract

Edge detection is one of the most commonly used operations in image analysis and digital image processing. Edge detection technique has a key role in machine vision and image understanding systems. In machine vision motion track and measurement system based on discrete feature, the exact feature edge orientation in the image is the precondition of the successful completion of the vision measurement task. Edges of an image are considered a type of crucial information that can be extracted by applying detectors with different methodology. Most of the classical mathematical methods for edge detection based on the derivative of the pixels of the original image are Gradient operators, Laplacian and Laplacian of Gaussian operators. Gradient based edge detection methods, such as Roberts, Sobel and Prewitts, have used two 2-D or 3-D linear filters to process vertical edges and horizontal edges

separately to approximate first-order derivative of pixel values of the image. The Laplacian edge detection method has used a 3-D linear filter to approximate second-order derivative of pixel values of the image. Major drawback of second-order derivative approach is that the response at and around the isolated pixel is much stronger. In this thesis, a robust edge detection method based Cellular Automata (CA) is proposed. Simulation results reveal that the proposed method can detect edges more smoothly in a shorter amount of time compared to the other edge detectors.

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