

论文

一种改进的Sobel图像边缘检测算法

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摘要:

边缘检测在数字图像处理和计算机视觉中有着重要的应用。对数字图像处理中具有代表性的Sobel边缘检测算法进行了分析。针对该算法存在检测出的边缘粗且对噪声极其敏感的缺点, 提出了一种改进算法。该算法对实际图像中出现的边缘类型进行了数学模型描述, 然后把连续型的边缘模型作为研究对象, 重新构造了对图像边缘方向进行检测的模板。针对Sobel边缘检测基于一阶导数极大值或二阶导数零交叉而带来的边缘定位准确度不高的缺点, 对图像梯度图进行了细化处理。仿真结果表明: 该算法对图像噪声干扰有较强的抑制能力, 提取的边缘定位准确、结构细腻。

关键词: 边缘检测 边缘细化 Sobel算子

Improved algorithm for Sobel edge detection of image

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Abstract:

Edge detection is used in image processing and computer vision. The typical Sobel edge detection algorithm in the digital image processing was analyzed. An improved algorithm for the image edge detection based on Sobel algorithm was proposed to overcome the disadvantages, which the obtained edges of the image is thick and sensitive to the noise. The edge types that exist in the real images are described with mathematical models and the models of the continuous edges are regarded as a research subject. A template for detecting the direction of the image edges was rebuilt. The thinning processing for the gradient histograms of images was adopted, to improve the low accuracy of locating the edge position, caused by the traditional Sobel edge detection which was based on one order derivative's maximum value or two-order derivative's zero-crossing. The simulated result shows that the algorithm has a better immunity to the noise jamming of images and the edge position extracted by the algorithm is accurate.

Keywords: edge detection edge thinning Sobel operator

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