

基于改进 LOG 算子的图像增强算法

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摘 要: 针对传统的高斯-拉普拉斯 (LOG) 算子处理图像边缘存在各向同性特点的问题, 提出了一种各向异性的 LOG 算法, 使之在图像增强中能自适应地处理各个角度的边缘. 首先在 LOG 函数的不同方向上取不同方差将尺度参数引入函数中, 然后结合几何学, 将角度参数引入带有尺度参数的算子中, 最后根据每个像素点的梯度值来确定尺度参数和角度参数的值, 得到各向异性的 LOG 算子. 仿真结果表明, 各向异性的 LOG 算子, 在峰值信噪比、结构相似性和均方误差方面均优于各向同性的 LOG 算子, 各向异性的 LOG 算子对噪声的抑制效果更好, 图像边缘细节保留的更多.

关键词: 图像增强; 高斯-拉普拉斯; 各向同性; 各向异性

An image enhancement algorithm based on improved LOG operator

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Abstract: Aiming at the problem of the isotropic characteristics existed while dealing with image edges through traditional Gaussian-Laplace (LOG) operator, an anisotropic LOG algorithm is proposed to adaptively process image edge of various angles during image enhancement. Firstly, the scale parameters are introduced into the function by taking different variances in different directions of the LOG function. Then, combining with the geometry, the angle parameters are introduced into the operator with the scale parameters. Finally, the scale parameters are determined according to the gradient values of each pixel. The value of the angle parameter gives the anisotropic LOG operator. The simulation results show that the anisotropic LOG operator is superior to the isotropic LOG operator in terms of peak signal-to-noise ratio, structural similarity and mean square error. Thus the anisotropic LOG operator has more suppression effect on noise while retaining more image edge details.

Key words: image enhancement; Gauss-Laplace; isotropy; anisotropy

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