图形、图像、模式识别

基于第二代**Curvelet**变换的低对比度图像增强

倪 雪, 李庆武, 陈小刚

河海大学 计算机及信息工程学院，江苏 常州 213022

摘要   针对传统图像增强方法用于低对比度图像时，存在对噪声敏感、局部过增强等问题，提出了一种基于第二代 Curvelet 变换的增强方法。将图像进行多尺度多方向的 Curvelet 变换；引入分段非线性函数的思想，调整低频子带系数，提高图像整体的对比度；对各尺度的高频子带系数进行非线性加权，增强图像细节，并进行阈值降噪。实验表明，该方法优于常用的空间域直方图均衡化和小波域图像增强法，能有效地提高图像的对比度、降低噪声，并且较好地保留边缘信息，具有良好的视觉效果。

关键词   Curvelet变换   小波变换   低对比度图像   图像增强   非线性增强函数
分类号

Low contrast image enhancement based on second generation curvelet transform

NI Xue,LI Qing-wu,CHEN Xiao-gang

College of Computer and Information Engineering，Hohai University，Changzhou，Jiangsu 213022，China

Abstract
  A novel low contrast image enhancement approach based on the second generation curvelet is proposed.It overcomes the shortcomings of conventional methods，such as sensitively to noise and local over-enhancement.Firstly，the source image is decomposed by Curvelet transform.Then a kind of nonlinear enhancing function is applied to enhance the image's global contrast in the low frequency subbands，and combining threshold denoising method with non-linear gain method to reduce the noise and enhance the details of image at each scale in the high frequency subbands.Finally，the enhanced coefficients are reconstructed to obtain enhanced image.Experimental results show that the proposed approach is superior to both histogram equalization and wavelet based contrast enhancement，it can preserve image edges and reduce the noise while enhancing contrast of the image，and also has good visual effect.

Key words   curvelet transform   wavelet transform   low contrast image   image enhancement nonlinear function

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通讯作者   倪 雪 nixue1213@126.com