论文与报告

基于三变量模型的剪切波去噪方法

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摘要
针对图像去噪问题, 提出了两种基于三变量模型的剪切波去噪方法. 首先利用互信息对剪切波系数间的依赖关系进行量化分析; 然后 根据依赖关系选取含噪系数s, s的父系数p以及与s方向相反的兄弟系数c, 建立了三变量最大后验估计模型. 在假定s, p, c具有相同标准差的情况下, 由估计模型推出一种具有闭式解的去噪方法(方法1); 对s, p, c具有不同标准差的情况, 给出了一种迭代去噪方法(方法2), 并证明了该方法的收敛性. 实验结果表明, 方法1和方法2不仅具有良好的视觉效果, 而且具有较高的峰值信噪比和结构相似度均值.

关键词　<u>图像去噪</u>　<u>统计模型</u>　<u>剪切波变换</u>　<u>互信息</u>　<u>最大后验估计</u>
分类号

Shearlet-based Image Denoising Using Trivariate Prior Model

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Abstract
Two shearlet-based denoising methods using trivariate prior model are proposed for image denoising. The dependency among shearlet coefficients is analyzed via mutual information. According to the dependency characterization, a noisy coefficient s, its parent coefficient p and its cousin coefficient c with opposite orientation are exploited to establish the trivariate maximum a posteriori estimate model. In the case of s, p, c having the same standard deviation, a simple closed-form solution is derived from the trivariate model. For s, p, c with different standard deviations, an iterative denoising method is given, and the convergence of the iterative algorithm is proved. Experimental results show that the denoised images by the proposed methods achieve not only better visual quality but also higher peak signal-to-noise ratio (PSNR) and mean structural similarity (MSSIM) values.

Key words　<u>Image denoising</u>　<u>statistical modeling</u>　<u>shearlet transform</u>　<u>mutual information</u>　<u>maximum a posteriori estimate</u>

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