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论文

一种基于噪声修整Contourlet变换的低码率图像压缩算法*

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摘要：

为了克服冗余性的Contourlet变换不利于图像压缩的缺陷,提出了噪声修整的Contourlet变换结构,或称为NS-Contourlet.该结构通过迭代的方式减少了量化后的非零系数数量,并且提高了非零系数的逼近能力.设计了一种可采用提升小波实现的拉普拉斯金字塔变换,有效地提高了Contourlet中拉普拉斯金字塔变换部分的速度.提出的NS-Contourlet结构结合EBCOT编码器实现了一种图像压缩算法,并且通过实验验证了该算法的有效性.尤其当低码率压缩(小于0.2 bpp)或者待压缩图像呈现直线纹理特征时,提出算法在主观视觉质量和PSNR指标上均优于JPEG2000,平均PSNR值提高了0.1～0.5 dB.

关键词： 图像处理　图像压缩　小波变换　Contourlet变换

Low Bitrate Image Compression Scheme Based on Noise-shaping Contourlet Transform

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Abstract:

A novel Contourlet transform structure based on the noise shaping,called NS-Contourlet,is proposed to overcome the disadvantage of redundancy to image compression.This structure decreases the amount of non-zero quantified coefficients by iteration,and improves their approximation ability.And,the Laplacian pyramid transform based on lifting wavelet is proposed to increase the transform speed effectively.An image compression algorithm is realized by combining the proposed NS-Contourlet with EBCOT codec.Lots of experiments testify the performances of the compression algorithm.It outperforms the JPEG2000 both in visually quality and in terms of PSNR at the low bitrate (< 0.20 bpp),especially for the images including abundant linear texture feature.Compared to JPEG2000 algorithm,the proposed algorithm improves 0.1~0.5 dB in terms of average PSNR.

Keywords: Image processing　Image compression　Wavelet transform　Contourlet transform

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