

论文与报告

基于局部DCT系数的图像压缩感知编码与重构

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摘要

引入了压缩感知(Compressed sensing, CS)理论, 给出了在获取局部二维离散余弦变换(Discrete cosine transform, DCT)系数的基础上高质量地编码与重构图像的新方法. 研究了在无量化和有量化情况下, 基于局部DCT系数的图像CS最小全变差重构算法. 在对DCT系数进行量化的过程中得到含噪的局部DCT系数, 在此基础上设计了能完成CS重构的图像编解码一般流程, 并构建了实际应用系统. 实验结果表明, 对于稀疏性较强的图像, 在图像编解码系统中结合CS理论与方法能得到高质量的重构图像, 与传统的直接反离散余弦变换(Inverse DCT, IDCT)方法相比, 峰值信噪比(Peak signal to noise ratio, PSNR)最大能提高5dB以上, 对于一般图像, PSNR也有较大提高.

关键词 [图像编码](#) [图像重构](#) [离散余弦变换](#) [压缩感知](#) [最小全变差](#)

分类号

Image Coding and Reconstruction via Compressed Sensing Based on Partial DCT Coefficients

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Abstract

This paper introduced the CS (compressed sensing) theory and proposed a new method to encode and reconstruct images after acquiring the partial two-dimensional DCT (discrete cosine transform) coefficients. The CS total variation reconstruction algorithms based on partial DCT coefficients with or without quantization were studied in this paper. In the quantization step, partial noisy DCT coefficients were obtained, based on which the general image coding/decoding process able to realize the CS reconstruction was designed, and a practical application system was made up. The experimental results showed that for images with strong sparsity, the image coding/decoding system integrated with CS theory and its methods can be used to obtain reconstructed images with high quality, and that compared with traditional direct inverse DCT (IDCT) method, the improved peak signal to noise ratio (PSNR) can be up to 5dB, and it also has some improvement in the term of PSNR for general images.

Key words [Image coding](#) [image reconstruction](#) [discrete cosine transform \(DCT\)](#) [compressed sensing \(CS\)](#) [minimum total variation \(TV\)](#)

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