

摘要: 针对任意形状感兴趣区域(ROI)编码算法在低码率下ROI重建质量差、编码时间长等问题,在优化的集合分裂树算法(SPIHT)基础上提出了一种适用于低码率的任意形状ROI编码方法。利用小波系数之间的空间位置相似性和所用小波滤波器的特征,以极少的码率实现了任意形状ROI掩模的描述,为提高算法效率奠定了基础;利用改进后的空间方向树结构以集合的形式测试ROI区域中更多的节点,提高了SPIHT中分类排序的扫描效率;以小波子带为单位的量化方法通过为每个小波子带选择合适的量化阈值优化了码流的输出,提高了低码率下ROI的重建质量。实验表明,提出的方法支持对多个任意形状ROI的编码;在不到0.04 bit/pixel的码率下描述出了整幅图像中任意形状ROI的掩模信息;在码率小于0.5 bit/pixel时,ROI的峰值信噪比(PSNR)比基于JPEG2000的多子带位平面平移(MSBShift)方法提高了2~7 dB,编码时间缩短了30%以上。该方法具有ROI的重建质量高、编码速度快等特点,适于在低码率下应用。

关键词: 任意形状感兴趣区域 感兴趣区域掩模 空间方向树 量化方法 Huffman编码

## Arbitrary shape ROI image encoding at low bit rate

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Abstract: An arbitrary shape ROI coding method based on modified Set Partitioning in Hierarchical trees (SPIHTs) is proposed to solve the problems of arbitrary shape Region of Interest(ROI) coding algorithms in low reconstructed image quality and inefficiency at a low bit rate. The ROI mask is described by combining the similarity of spatial position among wavelet coefficients with the specific wavelet filter at an extremely low bit rate, which lays a foundation for improving coding efficiency. The modified SPIHT partitioning structure is used to improve the coding efficiency of sorting pass by grouping more ROI entries together. A quantization method based on each wavelet subband optimizes the output bit stream in ROI encoding and improves the reconstructed image quality by choosing the proper threshold for each subband. Experiment results show that the proposed method can support multiple arbitrary shape ROIs and can describe the ROI mask information of the whole image at very low bit rate (less than 0.04 bit/pixel). Furthermore, at the bit rate less than 0.5 bit/pixel, the proposed algorithm has improved its Peak Signal to Noise Ratio(PSNR) by 2-7dB, and reduced the encoding time above 30% as compared with those of Multiple Subband Bitplane Shift (MSBShift) algorithm based on JPEG2000. It is concluded that the proposed method has higher reconstructed image quality, faster coding speed and is fit for image application at the low bit rate.

Keywords: arbitrary shape Region of Interest(ROI) ROI mask spatial orientation tree quantization method Huffman encoding

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