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算法研究

一种改进的基于柯西模型的H.264码率控制方法

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摘要：

H.264/AVC编码中的码率控制是通过有效控制输出码流的码率来提高其压缩视频质量的重要技术。本文基于H.264/AVC中的JVT-H017码率控制方案提出了一种改进算法。新算法根据H.264中DCT系数的分布特征，将柯西分布引入到码率控制模块，用更精确的柯西率失真模型取代了原先的二次率失真模型。在此基础上，进一步引入了一种联合PSNR比率和MAD比率进行图像复杂度预测的方法，并依此来调整帧级比特的分配和量化参数，克服了在出现复杂运动或场景切换时，因视频序列相邻帧之间相关性降低而导致的MAD预测失准的情况。实验结果表明，与JVT-H017方案及文献[5]中的算法比较，新的算法不仅具有更精确的码率控制，而且明显改善了输出码率的平稳性及重建图像的PSNR。

关键词： 码率控制 柯西分布 峰值信噪比比率和平均绝对差值比率

An Improved Rate Control Method for H.264 Based on Cauchy Rate Models

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Abstract:

Rate control in H.264 is a key technology which improves the quality of the compressed video via controlling the bit rate of output streaming. An improved algorithm is proposed on the basis of the JVT-H017 algorithm in this paper. According to the distribution of DCT coefficients in H.264, Cauchy rate module which replaces traditional quadric rate distortion model is adopted into the rate control. Moreover, a prediction algorithm which is used to predict the image complexity via PSNR ratio and MAD ratio is also proposed in this paper, and then the frame bits and QP can be adjusted based on the predicted results. Thus, in the case of complex movement or scene change, this prediction method can overcome the inaccuracy of MAD prediction method in the JVT-H017 algorithm because of the reduced correlation in the adjacent video frames. Simulation results show that, compared with the algorithm in JVT-H017 and reference [5], the new algorithm not only achieves more accurate rate control, but also obtains more stable output bit rate and better PSNR value of reconstructed image.

Keywords: Rate Control Cauchy Distribution Ratio of Peak Signal to Noise Ratio and Mean Absolute Difference Ratio

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