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H.264结构相似性最优的宏块层码率控制算法

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Structural Similarity Optimal MB Layer Rate Control Algorithm for H.264

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摘要 传统码率控制(RC)大多以客观失真作为失真度量，无法得到最优的主观质量。该文将基于结构相似(SSIM)的主观失真用于H.264视频编码的率失真优化和码率控制，提出了一种SSIM最优的宏块(MB)层码率控制(RC)算法。首先提出了一种经验型的SSIM线性失真模型，并结合改进的二次码率-量化(R-Q)模型用Lagrange乘子法得到了SSIM最优的MB层量化步长的闭式解。实验结果表明：该文算法相比客观质量最优的MB层RC算法JVT-O016更好地编码了图像结构信息，得到了更好的主观质量。

关键词： H.264 码率控制 主观质量 结构相似性

Abstract： Conventional Rate Control (RC) schemes take mostly objective metric as distortion measurement, which can not acquire optimal subjective quality. This paper applies Structural SIMilarity (SSIM) based subjective distortion to Rate Distortion Optimization (RDO) and RC in H.264 video coding, and proposes a SSIM optimal MacroBlock (MB) layer RC algorithm. First, an empirical SSIM linear distortion model is put forward. Then an improved quadratic Rate-Quantization (R-Q) model is combined to obtain the close-form solution of SSIM optimal MB layer quantization step by Lagrange multiplier. Experimental results show that the proposed method preserves much more image structural information and thus acquires better subjective quality compared with objective quality optimal MB layer RC scheme JVT-O016.

Keywords： H.264 Rate Control (RC) Subjective quality Structural SIMilarity (SSIM)

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