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CONTENT ADAPTIVE RATE CONTROL FOR H.264

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Abstract. *The H.264 video coding standard has significantly better coding efficiency compared to other existing standards, thanks to the fact that it has adopted a number of new techniques including a robust rate-distortion optimization (RDO) technique to select the best coding mode for each macroblock. Due to the uniqueness of RDO, it is difficult to apply the conventional rate control algorithms directly to the H.264 video coding. This paper proposes a new algorithm for H.264 rate control, and aims at improving coding quality of high motion scenes. Firstly, the motion estimations using all the possible modes are performed, and the mode that produces the least mean absolute difference is used to estimate the quantization parameter. Secondly, a new motion complexity measure is defined to represent the amount of motion contents between two consecutive frames, and is used to estimate the target bit of a frame. Experimental results show that our scheme can effectively improve video quality at scene changes and high motions, and reduce the sharp drops of PSNR as compared with the H.264 adopted rate control algorithm [1]. Moreover, our scheme also achieves an average PSNR gain of 0.129 dB for the test sequences.*

Keywords: H.264, Rate control, Rate-distortion optimization, Mode decision, Motion complexity

1. **Introduction.** H.264 [2] is the newest international video coding standard developed by the Joint Video Team (JVT), which consists of experts from VCEG and MPEG. It has achieved a significant improvement in coding efficiency compared to all the existing standards [3-5]. As in other video coding standards, H.264 employs hybrid DCT-like motion compensated predictive coding which intrinsically produces variable bit rates. The encoder employs rate control as a way to regulate variable bit rate characteristics of