coding are optimally allocated in macroblock level. Whether to use redundant coding and/or Intra coding and the quantization parameter of the redundant coding are all determined in the end-to-end rate-distortion optimization procedure. It is worth mentioning that, in the proposed approach only information from the previously encoded frames are used to calculate the end-to-end distortion in the RDO process, therefore, no additional delay is caused, making the proposed approach suitable for real-time applications such as video conference. Extensive experimental results show that the proposed method provides better performance than other error-resilient source coding approaches. The performance gap between the proposed approach and the Optimal Intra Refreshment is huge, and in some simulation environments, the proposed approach can provide 4dB higher PSNR than the conventional Optimal Intra Refreshment with the same bitrate. Our future work is to calculate the end-to-end distortion in sub-pixel accuracy, therefore more accurate end-to-end distortion would be available, which would eventually lead to better resource allocation.

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