An Optimized Transform and Quantization Scheme for HEVC Intra Lossless Coding

Xiaojie Liu[1], Linqi Yan[2], yang zhang[1], Gang Ren[2], and Mingdong Zhu[1]

[1]Department of Computer Science and Technology, Henan Institute of Technology, Xinxiang, China
[2]Henan Institute of Technology

September 26, 2023

Abstract

The lossless video coding framework based on HEVC is consisted of prediction and entropy coding, which directly determine the lossless coding efficiency. The initial residuals with large absolute values are directly coded by the lossy coefficient coding techniques in HEVC, which may compromise the lossless coding efficiency. In this paper, an optimized scheme based on transformation and quantization techniques for the HEVC Intra lossless coding is proposed as an additional mode. In the proposed scheme, an initial residual block is divided into two parts: the coefficient block and the second residual block. The coefficient block is derived by the lossy transformation and quantization technics in HEVC. The second residual block is made up with residuals of small absolute values. Both the coefficient block and the second residual block can be efficiently coded by the existing coefficient coding scheme in HEVC. Rate-distortion optimization is employed to choose between the proposed scheme and the transform bypass scheme to achieve the best coding performance for each block. The proposed scheme is implemented into the HM 12.1 software. Experimental results show that the proposed scheme achieves 3.36 percent bit-rate saving on average and up to 12.29 percent compared with the HEVC lossless coding under the Intra main configuration.

Hosted file

`An Optimized Transform and Quantization Scheme for HEVC Intra Lossless_V4.doc` available at https://authorea.com/users/668696/articles/668449-an-optimized-transform-and-quantization-scheme-for-hevc-intra-lossless-coding