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NEW DISTRIBUTED VIDEO CODING PARADIGM WITH PARTIAL BOUNDARY MATCHING ALGORITHM, SPATIO-TEMPORAL TEXTURE SYNTHESIS AND IMAGE INPAINTING

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Abstract. *This paper presents a new paradigm for the Distributed Video Coding (DVC), its coder architecture is quite different from the current DVC video coding architecture. In DVC codec we shift the complexity at encoder to the decoder side, which is suitable for many specific applications such as the low power surveillance, wireless mobile phone, and visual sensor network. Unlike the most popular current DVC coding scheme, named as the Wyner-Ziv (WZ) DVC codec; it divides video sequence into WZ frame and key frame (H.264/AVC Intra), instead we remove the WZ frame and design a new DVC codec architecture associated with key frame (i.e., H.264/AVC intra). Since in our proposed codec it is no need to design any channel coding (e.g. turbo coding or syndrome coding) as in the WZ frame, hence requires less computational complexity and reduces hardware cost of the encoder, simultaneously. Since the WZ frame was removed to avoid the rate-distortion (RD) performance degradation, the quality of decoded video sequences for relative high transmission rate (e.g., great than 350 Kbps) could be improved, while remains having similar RD performance as the WZ DVC codec in lower transmission rate. To verify the merits of the proposed DVC video coding scheme, four popular test video sequences are adopted, under specific imposed constraints. From computer simulation results we show that, in general, the RD performance improvement gain compared with the H.264/AVC Intra frame coding, is in the range of 0.5∼2.3dB.*
Keywords: Distributed video coding, Partial boundary matching algorithm, Spatio-temporal texture synthesis, Motion estimation at decoder

1. **Introduction.** Conventional video coding technologies, e.g., the ITU-T H.26x [1-8] and ISO/IEC MPEG-x [1,2], are mainly with the temporal and spatial redundancies between video frames to compress the original video sequences into number of smaller bits without affecting the decoded signal quality. In most current video coding paradigms, four main function-blocks are employed to perform the compression processes. First, motion compensation uses temporal prediction between video frames to explore the temporal redundancy. On the other hand, the transform coding typically using the Discrete Cosine Transform (DCT), is adopted to exploit the spatial redundancy, and the quantization process is taken place for quantizing the transform coefficients, to exploit the irrelevancy related to the human visual system limitations. Finally, the entropy coding is applied to exploit the statistical redundancy of the created coded symbols. Usually, the above-mentioned video compression standards perform interframe predictive coding