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Fast Prediction Unit Partition Decision and Accelerating the Algorithm Using Cudafor Intra and Inter Prediction of HEVC

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Abstract : Since the PU (Prediction Unit) decision process is the most time consuming part of the emerging HEVC (High Efficient Video Coding) standardin intra and inter frame coding, this paper proposes the fast PU decision algorithm and speed up the algorithm using CUDA (Compute Unified Device Architecture). In intra frame coding, the fast PU decision algorithm uses the texture features to skip intra-frame prediction or terminal the intra-frame prediction for smaller PU size. In inter frame coding of HEVC, the fast PU decision algorithm takes use of the similarity of its own two Nx2N size PU's motion vectors and the hierarchical structure of CU (Coding Unit) partition to skip some modes of PU partition, so as to reduce the motion estimation times. The accelerate algorithm using CUDA is based on the fast PU decision algorithm which uses the GPU to make the motion search and the gradient computation could be parallel computed. The proposed algorithm achieves up to 57% time saving compared to the HM 10.0 with little rate-distortion losses (0.043dB drop and 1.82% bitrate increase on average).

Keywords : HEVC, PU decision, inter prediction, intra prediction, CUDA, parallel
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