

Abstract

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Low bitrate multi-view video coding based on H.264/AVC

Multi-view Video Coding (MVC) is vital for low bitrate applications that have constraints in bandwidth, battery capacity and memory size. Symmetric and mixed spatial-resolution coding approaches are addressed in this thesis, where Prediction Architecture (PA) is investigated using block matching statistics. Impact of camera separation is studied for symmetric coding to define a criterion for the best usage of MVC. Visual enhancement is studied for mixed spatial-resolution coding to improve visual quality for the interpolated frames by utilising the information derived from disparity compensation. In the context of symmetric coding investigations, camera separation cannot be used as a sufficient criterion to Select suitable coding solution for a given video. Prediction architectures are proposed, where MVC that uses these architectures have higher coding performance than the corresponding codec that deploys a set of other prediction architectures, where the coding gain is up to 2.3 dB. An Adaptive Reference Frame Ordering (ARFO) algorithm is proposed that saves up to 6.2% in bits compared to static reference frame ordering when coding sequence that contains hard scene changes. In the case of mixed spatial-resolution coding investigations, a new PA is proposed that is able to save bitrate by 13.1 Kbps compared to the corresponding codec that uses the extended architecture based on 3D-digital multimedia. The codec that uses hierarchical B-picture PA has higher coding efficiency than the corresponding codec that employs the proposed PA, where the bitrate saving is 24.9 Kbps. The ARFO algorithm has been integrated with the proposed PA where it saves bitrates by up to 35.4 Kbps compared to corresponding codec that uses other prediction architectures. Visual enhancement algorithm is proposed and integrated within the presented PA. It provides highest quality improvement for the interpolated frames where coding gain is up to 0.9 dB compared to the corresponding frames that are coded by other prediction architectures.