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# A Novel Consistent Quality Driven for JEM based Distributed Video Coding

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**Abstract:** Distributed video coding (DVC) is an attractive and promising solution for low complexity constrained video applications, such as wireless sensor networks or wireless surveillance systems. In DVC, the visual quality consistency is one of the most important issues to evaluate the performance of a DVC codec. However, it is the fact that the quality of the decoded frames achieved in most recent DVC codecs is not consistent and it is varied with high quality fluctuation. To solve the problem, in this paper, we propose a novel DVC solution named JEM based DVC (JEM-DVC), which can provide not only higher performance compared to the traditional DVC solutions but also effective scheme for the quality consistency control. In the proposed JEM-DVC solution, we first employ several advanced techniques provided in the Joint exploration model (JEM) of the future video coding standard (FVC) to effectively improve the performance of JEM-DVC codec. Then, for consistent quality control, we propose two novel methods named key frame quantization (KF-Q) and Wyner-Zip frame quantization (WZF-Q) which determine the optimal values of quantization parameter (QP) and quantization matrix (QM) applied for the key and WZ frame coding, respectively. Unlike the conventional approaches, the optimal values of QP and QM are adaptively controlled and updated for every key and WZ frames to guarantee the consistent video quality for the proposed codec. Our proposed JEM-DVC is the first DVC codec in literature employing JEM coding technique, then all results presented in this paper are new. Experimental results show that the proposed JEM-DVC significantly outperforms the relevant DVC benchmarks, notably the DISCOVER DVC and the recent H.265/HEVC based DVC, in terms of both Peak signal-to-noise ratio (PSNR) performance and consistent visual quality.

**Keywords:** Distributed video coding; Joint exploration model (JEM); Future video coding (FVC); Visual quality consistency; DISCOVER DVC

## 1. Introduction

Video coding technologies have been playing an important role in the context of audiovisual services such as digital TV, mobile video, and internet streaming to cope with the high compression requirements. Most available video coding standards, notably the ITU-T H.26x and ISO/IEC MPEG-x standards [1], adopted the so-called predictive video coding paradigm where the temporal and spatial correlations are exploited at the encoder by using motion estimation/motion compensation and spatial transforms, respectively. As a result, these coding standards typically lead to rather complex encoders and much simpler decoder.