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Editorial

Editorial for Special Issue on Deep Learning-Based Data Compression

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During the past decade, the artificial intelligence research has been boosted by the popularity of deep convolutional neural networks and the variants, and thus the performances of scene analysis and understanding have been improved significantly. Simultaneously, people also found that the autoencoders can be adopted for image compression with better rate-distortion performance. This insightful attempt was then expanded to other similar problems for compressing video, point cloud, audio signals, and gene data, etc. The academia and industry communities are investing a lot of efforts to the area of deep learning-based data compression, and have achieved remarkable progress in algorithms, implementations, technical standards, and applications.

The first paper is titled "Learning-Based QP Initialization for Versatile Video Coding", authored by Zhentao Zhang, Hongji Zeng and Jielian Lin. This paper devises a learning-based method for determining the initial frame quantization parameter in versatile video coding. The quantization parameter is calculated based on the residual network with learning based on extracted features. Experimental results show the proposed method can have a lower control error compared with the reference software.

The second paper is titled "2D Gaussian Splatting for Image Compression", authored by Pingping Zhang, Xiangrui Liu, Meng Wang, Shiqi Wang and Sam Kwong. This paper gives a novel image compression method using 2D Gaussian splatting, which can have less encoding time. The Gaussians are parameterized with attributes, and initialized by sampling and blending. Experimental results

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show the optimized performance improvements in encoding speed compared with the implicit neural representation methods.

The third paper is titled "Human-Machine Collaborative Image and Video Compression: A Survey", authored by Huanyang Li, Xinfeng Zhang, Shiqi Wang, Shanshe Wang and Jingshan Pan. This paper surveys the image and video compression methods for human and machine vision perception. The existing compression methods are compared comprehensively, and the related future research directions are also carefully discussed.

The fourth paper is titled "PKU-DPCC: A New Dataset for Dynamic Point Cloud Compression", authored by Liang Xie, Xingming Mu, Ge Li and Wei Gao. This paper constructs a new dynamic point cloud dataset, named PKU-DPCC, for compression task, which owns better diversity and poses more compression challenges compared with the existing MPEG and AVS datasets. The experimental results for lossless and lossy coding of geometry and attribute indicate that the proposed dataset can be a new benchmark.

From these papers published in this special issue, readers can grasp the basic knowledge of the recent research and development outcomes on datasets and methods for deep learning-based data compression. This special issue is expected to arouse the interests of readers from both academia and industry to develop more advanced methods and technologies in this field to promote the practical applications.

Guest Editors
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