CALL for PAPERS

Advances in Generative Visual Signal Coding and Processing

Guest Editors

Zhibo Chen, University of Science and Technology of China, China (chenzhibo@ustc.edu.cn)

Heming Sun, Yokohama National University, Japan (sun-heming-vg@ynu.ac.jp)

Li Zhang, Bytedance Inc., US (lizhang.idm@bytedance.com)

Fan Zhang, University of Bristol, UK (fan.zhang@bristol.ac.uk)

Scope and Purpose

In recent years, generative models have emerged as one of the most significant and rapidly developing areas of research in artificial intelligence. Generative models have demonstrated remarkable success in synthesizing high-quality data (image, video, text, etc.) and hold the promise for utilizing unlabeled data, transfer learning, and many other applications. Moreover, it has also been proven that generative models are an important instrument for advancing research in AI-based visual signal coding and processing. For instance, variational autoencoders (VAE) has been used as a fundamental framework in end-to-end learning-based image coding schemes, autoregressive (AR) model has been extensively studied to improve entropy coding performance, and generative adversarial networks (GANs) has been utilized frequently to enhance the subjective quality of coding schemes. Meanwhile, generative models have also been explored in various visual signal processing tasks, including visual signal quality assessment, restoration, enhancement, editing, and interpolation.

In light of the rapid growth of generative visual signal coding and processing, its contributions to international standards and practical application optimization will be increasingly valued. The Joint Video Experts Team (JVET) of ITU-T VCEG and ISO/IEC MPEG has started working together on an exploration study to evaluate potential neural network-based video coding (NNVC) technology to surpass conventional hybrid video coding frameworks. Additionally, MPEG also launched many standardization projects which have started adopting AI-based technologies, such as AI-based 3D graphics coding, AI model compression and video coding for machines (VCM). Meanwhile, JPEG AI, the creation of a learning-based image coding standard, a joint standardization project between IEC, ISO and ITU, is under development.

In addition to performance gains, a key challenge with generative neural network models is their substantial computational and memory demands. Regarding the hardware and implementation, most frameworks are accelerated by the general-purpose accelerators. However, the hardware utilization of GPU/DPU is relatively low since the computation-to-communication ratio of a developed neural network may not fit the hardware resources such as the number of PE cores and bandwidth. To cater for the rapid update of neural network architectures, developing a general and efficient hardware accelerator is also challenging. Besides, to meet the practicality, some other issues such as privacy and security in generative visual signal coding and processing also need to be addressed.

The intent of this special issue is to present the latest developments in algorithms, implementations, and applications related to generative visual signal coding and processing technologies. Original and unpublished research results with topics in any of the following areas or beyond are hereby solicited.

Topics of Interest

- Generative visual signal (image, video, 3D, light field, point-cloud) coding
- Generative visual signal coding for machine vision applications
- Coding and transmission of AI generated content
- Quality assessment of AI generated content
- Visual quality assessment for generative visual signal coding and processing

- **Circuits and systems for generative visual signal coding and processing**
- **FPGA/ASIC implementation for generative model**
- **Complexity reduction for generative networks**
- **Generative visual data restoration and enhancement**
- **Compossible system for AI generated content**
- **Interactive content generation and editing**
- **3D content generation and editing**

Submission Procedure

Prospective authors are invited to submit their papers following the instructions provided on the JETCAS web-site: https://ieee.atyponrex.com/journal/jetcas. The submitted manuscripts should not have been previously published nor should they be currently under consideration for publication elsewhere.

Important Dates

- **Manuscript submissions due**   Dec. 15, 2023
- **First round of reviews completed**   Jan. 29, 2024
- **Revised manuscripts due**   Mar. 04, 2024
- **Second round of reviews completed**   Mar. 31, 2024
- **Final manuscripts due**   Apr. 15, 2024

Request for Information

Corresponding Guest Editor: Zhibo Chen, University of Science and Technology of China, China (chenzhibo@ustc.edu.cn)