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EDITORIAL
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Editorial: Video Content Production and Delivery Over IP Networks and Distributed Computing Facilities

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Editorial on the Research Topic

Video Content Production and Delivery Over IP Networks and Distributed Computing Facilities

This Research Topic had the objective of soliciting novel contributions to address the challenges and opportunities arising from the use of new Internet technology, cloud computing, and distributed computing and storage. Internet Protocol (IP)-based production and distribution platforms are now becoming more popular as they allow to replace costly bespoke infrastructures with simple IP networks connecting cloud-based computing and storage facilities. Such a trend calls for an overhaul of the different aspects involved in the multimedia production and delivery pipeline, most notably the compression technology used. On the production side of the pipeline, mezzanine compression is used to lower the bandwidth of the content being produced whilst guaranteeing low latency and streamlined post-production editing. Compression technologies used before the advent of IP-based solutions were ISO/IEC JPEG 2000, SMPTE VC-2 and Apple ProRes, to mention a few. In the case of JPEG 2000, the original design was targeting primarily hardware based solutions, not software ones which are more favoured by IP technologies. Accordingly, new mezzanine compression techniques, which can be run on general purpose computing commodities, are needed to migrate production towards IP-based solutions. The paper "High Throughput JPEG 2000 for Video Content Production and Delivery over IP Networks" by Taubman et al. provides a good overview of the high throughput extension of the JPEG2000 standard, which is designed to speed up the encoding process, enable software friendly implementations and maintain a degree of backward compatibility with JPEG2000 to ease the migration towards this new format. The paper presents an analysis of the standard's coding efficiency, its complexity and performance when run on Central Processing Unit (CPU) and Graphics Processing Unit (GPU), along with an estimate of the resources taken when implemented onto FPGA platforms. Moving down to the delivery part of the multimedia pipeline, novel compression techniques should be devised to reduce the bandwidth required to reach the final users. On this aspect, this Research Topic provides the reader with an interesting study described by the paper: "MPEG-5 LCEVC for 3.0 Next Generation Digital TV in Brazil" by Ciccarelli et al. The paper introduces another recently ratified MPEG standard: Low Complexity Enhancement Video Coding (LCEVC) which specifies how to encode the enhancement layers of a pyramidal video codec, with arbitrary compression technology used in the base layer. LCEVC can improve the video quality with potentially lower complexity as the base layer is run at a quarter of the resolution and the enhancement layers can be deployed on general purpose CPU/GPU hardware. The paper overviews LCEVC in the context of the future generation digital TV in Brazil, where the standard has been adopted as one of the two compression technologies used. In particular LCEVC has been appraised in

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the context of scalable video coding technology enhancing the H.266/VVC standard. The project aimed to show the improvements provided by H.266/VVC and LCEVC over the state-of-the-art in broadcasting which is represented by the H.265/HEVC standard. Accordingly, the paper reports such enhancements, measured in terms of both objective and subjective video quality scores collected *via* the different experiments described by the authors.

Use of cloud-based technologies will also facilitate the creation and distribution of content for virtual, augmented and mixed reality, so that volumetric data may be transmitted more efficiently. To guarantee interoperability in any ecosystem dealing with volumetric data, protocols for storage and transmission need to be defined. The paper "An Overview of the MPEG Standard for Storage and Transport of Visual Volumetric Video-based Coding" by Ilola et al. provides a thorough and comprehensive description of the family of standards grouped in the Visual Volumetric Video-based Coding (V3C) standard defined by the ISO/IEC JTC1, SC29 MPEG. The paper describes how the capture and transmission of volumetric data is handled in V3C standards and which are the best practices to store and deliver this type of data.

The design of video compression formats for any type of video content (conventional 2D camera captured or volumetric) would not be effective without the use of proper quality assessment metrics, methodologies and publicly available data. The paper "BVI-CC: A Dataset for Research on Video Compression and Quality Assessment" by Katsenou et al. presents an extensive study aimed to provide the community with a dataset of content, objective and subjective scores associated with the evaluation of common state-of-the-art video coding standards used in modern streaming scenarios, where adaptive bitrate techniques are also considered. Public access to these datasets would streamline and allow the video coding community to produce significant steps in the design of novel compression schemes and/or engineering the existing ones.

To conclude, we believe this Research Topic has provided the reader with a comprehensive overview of the upcoming technologies and applications associated with the use of IP networks, cloud computing, and distributed computing and storage.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

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The remaining author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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