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Point Cloud Compression – MPEG evaluates responses to call for proposal and kicks off its technical work

Macau, China – The 120th MPEG meeting was held in Macau, China, from 23 – 27 October 2017

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At its 120th meeting, MPEG analyzed the technologies submitted by nine industry leaders as responses to the Call for Proposals (CfP) for Point Cloud Compression (PCC). These technologies address the lossless or lossy coding of 3D point clouds with associated attributes such as colour and material properties.

Point clouds, unordered sets of points in a 3D space, are typically captured using various setups of multiple cameras, depth sensors, LiDAR scanners, etc., but can also be generated synthetically and are in use in several industries. They have recently emerged as representations of the real world enabling immersive forms of interaction, navigation, and communication. Targeted applications include immersive real-time communication, six Degrees of Freedom (6 DoF), virtual, augmented, and mixed reality, dynamic mapping for autonomous driving, and cultural heritage applications.

Point clouds are typically represented by extremely large amounts of data, which is a significant barrier for mass market applications. MPEG issued a Call for Proposal seeking technologies that allow reduction of point cloud data for use in its intended applications.

After a formal objective and subjective evaluation campaign, MPEG selected three technologies as starting points for the test models for static, animated, and dynamically acquired point clouds. A key conclusion of the evaluation was that state-of-the-art point cloud compression can be significantly improved by leveraging decades of 2D video coding technology development and combining 2D and 3D compression technologies. Such an approach provides synergies with existing hardware and software infrastructures for rapid deployment of new immersive experiences.

The omnidirectional media format (OMAF) has reached its final milestone

The understanding of the virtual reality (VR) potential is growing but market fragmentation caused by the lack of interoperable formats for the storage and delivery of such content is stifling VR's market potential. MPEG's project known as Omnidirectional Media Format (OMAF) has reached the Final Draft International Standard (FDIS) stage at its 120th meeting. OMAF includes two ways of representing an omnidirectional scene in video pictures: a classical "equirectangular" projection like what has been used historically for maps of the globe, and a mapping of the scene onto the faces of a cube. It supports signalling of the metadata required for interoperable rendering of 360-degree monoscopic and stereoscopic audio-visual data, and provides a selection of audio-visual encoding formats for this application. It also includes technologies to arrange video pixel data in numerous ways to improve compression efficiency and reduce the size of video, a major bottleneck for VR applications and services. The standard also includes technologies for the delivery of OMAF content with MPEG-DASH and MMT.

MPEG is planning to host an OMAF Developers' Day to facilitate adoption of the standard by the industry and to build an ecosystem around this standard. The event will be held in January 2018 in Gwangju, Korea. More information about the event can be found at <https://mpeg.chiariglione.org/>.

MPEG-G standards reach Committee Draft for compression and transport technologies of genomic data

The availability of high-throughput DNA sequencing technologies opens up new perspectives in the treatment of several diseases, making possible the introduction of new global approaches in public health known as "precision medicine". While routine DNA sequencing in the doctor's office is still not current practice, medical centres have begun to use sequencing to identify cancer and other diseases and to find effective treatments. As DNA sequencing technologies produce extremely large amounts of DNA sequence data and related information, the ICT costs of storage, transmission, and processing are also very high. The MPEG-G standard addresses and solves the problem of efficient and economical handling of genomic data by providing new compression and transport technologies.

The MPEG-G standards are the results of the synthesis of technologies collected in response to a Call for Proposals issued at MPEG's 115th meeting in collaboration with the working group for standardization of data processing and integration of the ISO Technical Committee for biotechnology standards (ISO TC 276/WG 5).

At its 120th meeting, MPEG promoted its first set of specifications of the family of MPEG-G standards to Committee Draft (CD) level. These standards provide a new compression technology (ISO/IEC 23092-2) for genomic sequencing data and a set of technologies (ISO/IEC 23092-1) supporting rich functionality for the transport of genomic data on networks and the storage of the data in files. The further standardization plan for MPEG-G includes the Committee Drafts for metadata and APIs (ISO/IEC 23092-3) and reference software (ISO/IEC 23092-4), which are to be issued at the next MPEG meeting with the objective of producing Draft International Standards (DIS) at the end of 2018.

Beyond HEVC – The MPEG & VCEG call to set the next standard in video compression

The 120th MPEG meeting marked the first major step toward the next generation of video coding standard in the form of a joint Call for Proposals (CfP) with ITU-T SG16's VCEG. After two years of collaborative informal exploration studies and a gathering of evidence that successfully concluded at the 118th MPEG meeting, MPEG and ITU-T SG16 agreed to issue the CfP for future video coding technology with compression capabilities that significantly exceed those of the HEVC standard and its current extensions. They also formalized an agreement on formation of a joint collaborative team called the "Joint Video Experts Team" (JVET) to work on development of the new planned standard, pending the outcome of the CfP that will be evaluated at the 122nd MPEG meeting in April 2018. To evaluate the proposed compression technologies, formal subjective tests will be performed using video material submitted by proponents in February 2018. The CfP includes the testing of technology for 360° omnidirectional video coding and the coding of content with high-dynamic range and wide colour gamut in addition to conventional standard-dynamic-range camera content.

Anticipating a strong response to the call, a "test model" draft design is expected to be selected in 2018, with development of a potential new standard in late 2020.

MPEG adds better support for mobile environment to MMT

At its 120th meeting, MPEG has promoted to Final Draft Amendment (FDAM) the "enhancements for mobile environments" for MPEG Media Transport (MMT; ISO/IEC 23008-1:2017). In order to reflect industry needs on MMT, which has been well adopted by broadcast standards such as ATSC 3.0 and Super Hi-Vision, the new amendment addresses several important issues on the efficient use of MMT in mobile environments. For example, it defines a distributed resource identification message to facilitate multipath delivery and a transition request message to change the delivery path of an active session. This amendment also introduces the concept of a MMT-aware network entity (MANE), which might be placed between the original server and the client. A detailed description is provided about how to use a MANE both for improving efficiency and reducing delivery delay. Additionally, this amendment provides a method to use WebSockets to set up and control an MMT session/presentation.

New standard completed for Internet Video Coding

A new standard for video coding suitable for use on the internet as well as other video applications, was completed at the 120th MPEG meeting. The Internet Video Coding (IVC) standard was developed with the intention of providing the industry with an "Option 1" video coding standard. In ISO/IEC language, this refers to a standard for which patent holders have declared a willingness to grant licenses for all necessary patents free of charge to an unrestricted number of applicants on a worldwide, non-discriminatory basis and under other reasonable terms and conditions, to enable others to make, use, and sell implementations of the standard.

At the time of completion of the IVC standard, the specification contained no identified necessary patent rights except those available under Option 1 licensing terms. During the development of IVC, MPEG removed from the draft standard any necessary patent rights that it was informed were not available under such Option 1 terms, and MPEG is optimistic of the outlook for the new standard. MPEG encourages interested parties to provide information about any other similar cases.

The IVC standard has roughly similar compression capability as the earlier AVC standard, which has become the most widely deployed video coding technology in the world. Tests have been conducted to verify IVC's strong technical capability, and the new standard has also been shown to have relatively modest implementation complexity requirements.

Evidence of new video transcoding technology using side streams

Following a "Call for Evidence" (CfE) issued by MPEG in July 2017, evidence was evaluated at the 120th MPEG meeting to investigate whether video transcoding technology has been developed for transcoding assisted by side data streams that is capable of significantly reducing the computational complexity without reducing compression efficiency.

The evaluations of the four responses received included comparisons of the technology against adaptive bit-rate streaming using simulcast as well as against traditional transcoding using full video re-encoding.

The responses span the compression efficiency space between simulcast and full transcoding, with trade-offs between the bit rate required for distribution within the network and the bit rate required for delivery to the user. All four responses provided a substantial computational complexity reduction compared to transcoding using full re-encoding.

MPEG plans to further investigate transcoding technology and is soliciting expressions of interest from industry on the need for standardization of such assisted transcoding using side data streams.

How to contact MPEG, learn more, and find other MPEG facts

To learn about MPEG basics, discover how to participate in the committee, or find out more about the array of technologies developed or currently under development by MPEG, visit MPEG's home page at <https://mpeg.chiariglione.org/>. There you will find information publicly available from MPEG experts past and present including tutorials, white papers, vision documents, and requirements under consideration for new standards efforts. You can also find useful information in many public documents by using the search window including publicly available output documents of each meeting (note: some may have editing periods and in case of questions please contact Dr. Christian Timmerer).

Examples of tutorials that can be found there include tutorials for: High Efficiency Video Coding, Advanced Audio Coding, Universal Speech and Audio Coding, and DASH to name a few. A rich repository of white papers can also be found and continues to grow. You can find these papers and tutorials for many of MPEG's standards freely available. Press releases from previous MPEG meetings are also available. Journalists that wish to receive MPEG Press Releases by email should contact Dr. Christian Timmerer at christian.timmerer@itec.uni-klu.ac.at or christian.timmerer@bitmovin.com.

Further Information

Future MPEG meetings are planned as follows:

No. 121, Gwangju, KR, 22 – 26 January 2018

No. 122, San Diego, US, 16 – 20 April 2018

No. 123, Ljubljana, SI, 16 – 20, July 2018

No. 124, Macau, CN, 08 – 12, October 2018

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