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PROGRAM

Data Compression Conference (DCC 2021)

Sponsored by U. Arizona, Brandeis U., Microsoft Research, IEEE Signal Processing Society
Proceedings published by IEEE Computer Society Conference Publishing Services (CPS)

Virtual Format (originally scheduled for Snowbird, Utah) March 23 - March 26, 2021

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DCC 2021 is a Virtual Format

Due to continued widespread restrictions caused by the COVID19 pandemic, the DCC 2021 conference format is virtual.

The keynote presentation format is live with questions at the time listed.

Information for on-line access to all presentations, question and answer forums, posters, and the conference proceedings will be provided to registered participants.

WEDNESDAY, March 24
12:30pm - 1:30pm U.S. Mountain Daylight Time (Utah time)

Keynote Speaker

(live presentation)

User-Generated Video Quality Prediction: From Local to Global

Alan C. Bovik, Director

Laboratory for Image and Video Engineering
The University of Texas at Austin

In this talk I will discuss recent experiments targeting a deeper understanding of the relationships between global and local space-time perception of video quality. Specifically, I will discuss the difficulty of assessing the quality of user-generated videos, which are often distorted, often by multiple commingled processes, and our latest approaches to attacking the problem using deep network architectures.

Al Bovik is the Cockrell Family Regents Endowed Chair Professor at The University of Texas at Austin. He has received many major international awards, including a 2020 Technology and Engineering Emmy Award, the 2019 Progress Medal of the Royal Photographic Society, the 2019 IEEE Fourier Award, the 2017 Edwin H. Land Medal from the Optical Society of America, a 2015 Primetime Emmy Award for Outstanding Achievement in Engineering Development from the Academy of Television Arts and Sciences, and the Norbert Wiener and 'Sustained Impact' Awards of the IEEE Signal Processing Society. His is a Fellow of the IEEE, the Optical Society of America, and SPIE. His books include The Handbook of Image and Video Processing, Modern Image Quality Assessment, and The Essential Guides to Image and Video Processing. Al co-founded and was the longest-serving Editor-in-Chief of the IEEE Transactions on Image Processing and created the IEEE International Conference on Image Processing in Austin, Texas, in November, 1994.

THURSDAY, March 25
12:30pm - 1:30pm U.S. Mountain Daylight Time (Utah time)

Keynote Speaker

(live presentation)

Versatile Video Coding (VVC) Delivers: Coding Efficiency and Beyond

Gary J. Sullivan

Microsoft Research
co-chair of the ITU-T/ISO/IEC Joint Video Experts Team (JVET)

The year 2020 was unusual and difficult, and it moved compressed video applications to the forefront of everyday life. As the world was hit by a global pandemic on a scale not experienced for a full century, travel and physical interaction outside the home ground to a halt, and people were forced to move much of their life online. Video became central to learning, work, entertainment, health care and socializing, and the growth of video traffic further accelerated. Video usage had already been on an upward trajectory so steep that it had become 80% of internet traffic and was commanding strong attention from the industry, with especially strong growth in ultra high definition television (UHD), high dynamic range (HDR), security monitoring, and emerging immersive applications.

Meanwhile, the development of the next major generation of video coding standard proceeded to completion in the international community. The finalization of Versatile Video Coding (VVC) coincided with the historical year of 2020 as well, arriving to help meet these challenges. Undeterred by the inability to hold face-to-face meetings, the standards groups have adapted and managed to deliver the new standard without delaying its development schedule. Like MPEG-2, H.264 / MPEG-4 AVC and H.265 / HEVC before it, VVC's main goal has been to address the longstanding problems of the massive bandwidth needed for video and the insatiable desire for improved quality and expanding usage. The fundamental requirement for VVC has been to achieve roughly a 2× improvement in coding efficiency – i.e., a bit rate reduction over its H.265 / HEVC predecessor on the order of 50% for the same visual quality. Considering that most applications are still using AVC, which HEVC had already greatly surpassed by a similar amount, the value proposition posed by VVC in today's market is truly compelling.

Besides coding efficiency, and as its name emphasizes, versatility is also a central design goal of VVC. A broad diversity of the latest application needs was considered in the development of the VVC standard. Application requirements that were strongly emphasized during its design included UHD, HDR, computer-generated and screen-captured content (e.g., for screen sharing), 360-degree immersive video, and compressed-domain bitstream repurposing. These needs resulted in new coding tools and new high-level functionalities supported in the syntax. Further, VVC version 1 includes profiles that support still picture coding, multi-layer coding, e.g. for spatial, quality and multi-view scalabilities, and the coding of video in non-4:2:0 chroma formats.

Like its major predecessors, VVC has been developed jointly by the two largest international standardization organizations for video coding – the ITU-T Video Coding Experts Group (VCEG) and the ISO/IEC Moving Picture Experts Group (MPEG). The partnership is known as the Joint Video Experts Team (JVET), and the result is approval of the new design as both ITU-T H.266 and ISO/IEC 23090-3 (MPEG-I Part 3). The core normative VVC specification is also accompanied by a new Versatile Supplemental Enhancement Information (VSEI) standard, referenced as ITU-T H.274 and ISO/IEC 23002-7, which generalizes the approach to handling supplemental data for broad and versatile applicability as well.

Beyond the VVC version 1 specification document, early implementations of VVC have begun to emerge to confirm that the new standard is implementable and ready for real-world deployment. The JVET is also now hard at work developing a version 2 of VVC, which will enhance the design for higher bit-depth and higher bit-rate applications and add other supplemental data and possibly other coding improvement features as well. Beyond VVC, new work is also under way to explore the potential of deep-learning technology for interoperable standardization, with great promise shown in early studies.

Even as we strive to put the COVID-19 pandemic behind us sometime in 2021, the demand for more and better video technology will continue to grow. The new VVC standard will help to meet these needs, and will help illuminate the path forward for the next advances to come.

Gary J. Sullivan has been a chairman and co-chairman of various video and image coding standardization activities in ITU-T VCEG, ISO/IEC MPEG, ISO/IEC JPEG, and in their joint collaborative teams since 1996 and in 2021 became the chair of ISO/IEC JTC 1 Subcommittee 29, the organization that oversees JPEG and MPEG. He has led the development of the Advanced Video Coding (AVC) standard (ITU-T H.264 | ISO/IEC 14496-10), the High Efficiency Video Coding (HEVC) standard (ITU-T H.265 | ISO/IEC 23008-2), the Versatile Video Coding (VVC) standard (ITU-T H.266 | ISO/IEC 29090-3), the various extensions of those standards, and several other standardization projects. He is a Video and Image Technology Architect at Microsoft Research. At Microsoft, he has also been the originator and lead designer of the DirectX Video Acceleration (DXVA) video decoding feature of the Microsoft Windows operating system.

The team efforts that Sullivan has led have been recognized by three Emmy Awards. He has received the SMPTE Digital Processing Medal, the IEEE Masaru Ibuka Consumer Electronics Award, the IEEE Consumer Electronics Engineering Excellence Award, two IEEE Trans. CSVT Best Paper awards, the INCITS Technical Excellence Award, the IMTC Leadership Award, and the University of Louisville J. B. Speed Professional Award in Engineering. He is a Fellow of the IEEE and SPIE.

SESSION 1, *Special Session - "Video Coding Technologies"*

SESSION 2

SESSION 3

SESSION 4

SESSION 5, *Special Session - "Neural Networks for Compression"*

SESSION 6

SESSION 7, *Special Session - "Compression and Quantization in Learning"*

SESSION 8

Poster Session

(listed alphabetically by first author)