Trends and Recent Developments in Video Coding Standardization

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Abstract:

While HEVC is the state‐of‐the‐art video compression standard with profiles addressing virtually all video‐related products of today, the next generation of standards is already taking shape, showing significant performance improvements relative to this established technology. At the same time, the target application space evolves further towards higher picture resolution, higher dynamic range, fast motion capture, or previously unaddressed formats such as 360° video. The signal properties of this content open the door for different designs of established coding tools as well as the introduction of new algorithmic concepts which have not been applied in the context of video coding before. Specifically, the required ultra‐high picture resolutions and the projection operations in the context of processing VR/360° video provide exciting options for new developments.

This tutorial will provide a comprehensive overview on recent developments and perspectives in the area of video coding. As a central element, the work performed in the Joint Video Exploration Team (JVET) of ITU‐T SG16/Q6 (VCEG) and ISO/IEC JTC1 SC29WG11 (MPEG) is covered, but trends outside of the tracks of standardization bodies are considered as well. By the time of the tutorial, results of the Call for Proposals on the next generation video compression standard will be available, and technologies under consideration for establishing a test model will be reported. Subjective and objective quality assessment of new approaches in comparison to HEVC will be discussed as well. The focus of the tutorial is on algorithms, tools and concepts for future video compression technology with significantly increased performance. In this context, also the potential of methods related to perceptional models, synthesis of perceptional equivalent content, higher precision of motion compensation, and deep learning based approaches will be discussed.

Bio:

**Jens‐Rainer Ohm** holds the chair position of the Institute of Communication Engineering at RWTH Aachen University, Germany since 2000. His research and teaching activities cover the areas of motion-compensated, stereoscopic and 3‐D image processing, multimedia signal coding, transmission and content description, audio signal analysis, as well as fundamental topics of signal processing and digital communication systems.

Since 1998, he participates in the work of the Moving Picture Experts Group (MPEG). He has been chairing/co‐chairing various standardization activities in video coding, namely the MPEG Video Subgroup since 2002, the Joint Video Team (JVT) of MPEG and ITU‐T SG 16 VCEG from 2005 to 2009, and currently, the Joint Collaborative Team on Video Coding (JCT‐VC), as well as the Joint Video Exploration Team (JVET).

Prof. Ohm has authored textbooks on multimedia signal processing, analysis and coding, on communication engineering and signal transmission, as well as numerous papers in the fields mentioned above.

**Mathias Wien** received the Diploma and Dr.‐Ing. degrees from RWTH Aachen University, Germany, in 1997 and 2004, respectively. He currently works as a senior research scientist and head of administration, as well as lecturer, holding a permanent position at the Institute of Communication Engineering of RWTH Aachen University, Germany. His research interests include image and video processing, space‐frequency adaptive and scalable video compression, and robust video transmission.

Mathias has participated and contributed to ITU‐T VCEG, ISO/IEC MPEG, the Joint Video Team, and the Joint Collaborative Team on Video Coding (JCT‐VC) of VCEG and ISO/IEC MPEG in the standardization work towards AVC and HEVC. He has co‐chaired and coordinated several AdHoc groups as well as tooland core experiments. He has published the Springer textbook “High Efficiency Video Coding: Coding Tools and Specification”, which fully covers Version 1 of HEVC. An extended edition covering the subsequent versions of HEVC is in preparation.

Mathias is member of the IEEE Signal Processing Society and the IEEE Circuits and Systems Society. At RWTH Aachen University, Mathias teaches the master level lecture “Video Coding: Algorithms and Specification”, among other topics. The lecture covers the state of the art in video coding including HEVC.



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