Versatile Video Coding

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Versatile Video Coding

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Preface

The primary focus is on the developments beyond High-Efficiency Video Coding (HEVC). The new standard called versatile video coding (VVC) is projected to be finalized by 2020. A detailed description of the tools and techniques that govern the encoder indirectly and the decoder directly is intentionally avoided as a number of books (specially by the specialists who are directly involved in proposing/contributing/evaluating/finalizing the detailed processes that constitute the standards) are already available in this field, besides the overview papers, standards documents, reference software, software manuals, test sequences, source codes, tutorials, keynote speakers, panel discussions, reflector, and ftp/web sites – all in the public domain. Access to these categories is also provided. Since 2014, in the standards arena in HEVC, range extensions and new profiles (3D, multi-view, scalability, screen content coding – SCC) have been finalized. Also others such as MPEG-4 Internet Video Coding (ISO/IEC 14496-33) and AVS2 (IEEE 1857-4) have been standardized. Similarly, the industry has also finalized codecs such as, DAALA, THOR, VP9 (Google), VC1 (SMPTE), real media HD (Real Networks), and DSC (display stream compression) by VESA (Video Electronics Standards Association). AV1 (Alliance for Open Media, AOM) has been finalized. A brief introduction to the joint exploration model (JEM) by joint video experts team (JVET), versatile video coding (VVC), and future video coding (FVC) is provided. References related to 360-degree video coding are also listed. Other interesting and relevant topics such as cross-media retrieval and multiple description coding are also described.

This book provides access to all these developments. International, regional, and national standards organizations, industry groups (alliances), professional societies, etc. are continuously exploring more efficient video coding techniques.

A brief description of FVC beyond HEVC/H.265 is provided. Nearly 500 references related to HEVC and other emerging video coding standards are added along with 405 projects/problems. The latter are self-explanatory and govern the spectrum from a 3-hour graduate credit to research at the

masters and doctoral levels. Some require a dedicated group of researchers with extensive computational (software) and testing facilities. Additional projects/problems based on image coding standards (both developed and some in final stages) such as JPEG2000, JPEG LS, JPEG XR, JPEG-XT, JPEG XS (call for proposals for a low-latency lightweight image coding system issued in March 2016 by JPEG and almost finalized in April 2018), JPEG-HDR, and JPEG-PLENO are added. References, overview papers, panel discussions, tutorials, open source software, test sequences, conformance bit streams, etc. emphasizing these topics are also listed. A brief description related to JVET, also known as next-generation video coding (NGVC), formed by both MPEG and VCEG, is targeted for a potential new standard by the end of 2020. This is also called VVC. Also, VESA issued a "call for technology" with the objective to standardize a significantly more complex codec called ADSC (advanced DSC) that is visually lossless at a bit rate lower than DSC. The AVS workgroup of China is on a fast forward track in adding SCC capability to AVS2. All these developments can immensely help the researchers, academia, and the graduate students and provide food for thought to delve deeply into the fascinating world of multimedia compression.

The reader is now well aware that this book is mainly at the research/reference level rather than as a textbook. It challenges the academic/research/industrial community regarding not only the present state-of-the-art but also, more specifically, the future trends and projections. Hence, it is an invaluable resource to this community.

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