

Preface

To our knowledge this book is unique and unusual in the sense that it consolidates all the recent major video coding standards: AVS China, H.264/MPEG-4 Part 10 (here after referred to as H.264/AVC), VP6 (now VP10), DIRAC, VC-1/2 and HEVC/NGVC (high efficiency video coding/next generation video coding). All these standards with the exception of the later have been adopted by the industry (at various levels) developing consumer electronics products for mass markets (set top boxes, search engines, lap tops, PCs, tablets, net books, digital cameras, DVDs, Blu-ray discs, smart phones, various hand held/mobile devices, VOD, video streaming, etc.). Products based on HEVC/NGVC are under various stages of development as can be observed from various papers (conference proceedings, journal papers, tutorials, keynote speeches—see [Chap. 5](#)). The focus of this book has been mainly on the basic functionalities, tools, techniques and operations inherent in these standards leading to compression/coding at various bit rates, quality levels and applications. Intentionally, detailed step-by-step process for their implementation is left out. However, thorough understanding of the standards, besides their performance comparison and limitations are presented. With on line resources such as web/ftp sites, standards documents, open source software, review papers (both journal publications and conference presentations), keynote speeches, tutorials, reflectors and related resources, the reader is well equipped to implement the encoders and decoders at various profiles and levels and evaluate their performances.

With insight and ingenuity, the reader can improve the performance, reduce the complexity and explore additional applications. Other than [Chaps. 1](#) and [2](#), the remaining chapters end with projects (can be tailored to M.S. theses and some of them even to Ph.D. dissertations) presented as thought provoking items. Added to this is the prospect of transcoding from one standard to another (not encoder/decoder of one standard followed by encoder/decoder of another standard). This is to be accomplished by using parts of the encoded bit stream of one standard effectively/efficiently in the other standard thus significantly reducing the overall complexity of the transcoder. This by itself is no easy task. However, many challenges have been overcome i.e. MPEG-2 to H.264/AVC transcoder and vice versa and low complexity H.264/AVC to VC-1 transcoding.

HEVC/NGVC (See [Chap. 5](#)) is the latest standard that is aimed at reducing the bit rate by nearly 50 % at the same visual quality compared with H.264/AVC. It has come out as a final draft international standard (FDIS) in January 2013 (main, 10 bit depth and all intra profiles) with the working draft updated periodically. This has been approved by ITU as ITU-T H.265/ISO/IEC 23008-2 HEVC in January 2013. It is projected that the HEVC-based decoders will reach 2 billion by end of 2016. This is followed by extensions such as scalable video coding (SVC) and multi-view coding (3D video, free view point video, stereoscopic video, etc.) scheduled for standardization in 2014. These developments provide a fertile ground for R&D besides the transcoder from an established standard such as H.264/AVC to HEVC and vice versa (See projects at the end). The main focus of this book is on video with little description on audio. However, some theses/projects describe in detail the coding and multiplexing of the video/audio bit streams at the encoder followed by demultiplexing and decoding of these bit streams while maintaining the lip sync between the video and audio. The reader is referred to Dr. Rao's website <http://www-ee.uta.edu/dip> (click on courses and then click on EE5359 multimedia processing, scroll down to access theses/projects/pp slides/papers/proposals, etc.) i.e. multiplexing/de-multiplexing AVS China video with AAC audio bit streams achieving lip sync and multiplexing/de-multiplexing H.264/AVC video with HE-AAC audio bit streams achieving lip sync.

[Chapters 6–8](#) address the functionalities involved in VP6 (originally developed by On2 Technologies—subsequently acquired by Google) with websites related to VP9/VP10, DIRAC developed by BBC, which uses wavelets rather than the traditional DCT/INT DCT and VC-1 based on Windows Media Video 9 of Microsoft, respectively. Apart from [Chaps. 1](#) and [2](#) all the others are supplemented by projects many of which are at the M.S. and Ph.D. levels. Appendices A thru H (based on former graduate students in the University of Texas at Arlington except Appendices B and H) provide additional resources that complement the projects many of which are at the M.S. and Ph.D. levels. Bibliography provides a plethora of references including web/ftp sites, review papers, standards documents, keynote speeches, special issues, open source software, etc., related to video coding standards presented in [Chaps. 3–8](#).

It is hoped that this book and all the resources outlined can provide the reader the prospects for understanding and implementation of these standards. With foresight the reader can propose changes/additions/extensions/modifications to these standards leading to improved performance, reduced complexity and additional applications. Purposely, the book is not aimed as a text for any specific course. On the contrary it is projected to be a reference at the graduate/research levels for academia, research institutes and industry.

Video coding standards

AVS China, H.264/MPEG-4 PART 10, HEVC, VP6, DIRAC
and VC-1

Rao, K.R.; Kim, D.N.; Hwang, J.J.

2014, XXIII, 499 p. 335 illus., Hardcover

ISBN: 978-94-007-6741-6