
Book review

King N. Ngan, Chi W. Yap and Keng T. Tan, *Video Coding for Wireless Communication Systems*, Marcel Dekker, 2001

The book consists of eight chapters. Chapter 1 addresses source coding methods for images and video: for images, DCT-based JPEG and wavelet-based set partitioning in hierarchical trees (SPIHT) are briefly described; for video, temporal coding and video coding standards H261, H263 and MPEG-2 are briefly described.

Chapter 2 is mainly devoted to the MPEG-4 standard for multimedia applications. Coding of video objects (e.g., shape and texture), synthetic objects (e.g., facial and body animation) and error resilient coding aspects in the standards are briefly described.

Chapter 3 describes the basic channel coding methods relevant to video, including block codes (such as hamming, cyclic, BCH and Reed-Solomon codes) and convolutional codes (such as rate compatible punctured convolutional codes) with soft decision using Viterbi algorithms.

Chapter 4 contributes to radio channel modelling. After describing the phenomena in wireless signal propagation over indoor, outdoor and satellite environment, relations of radio channel parameters, such as time delay spread versus coherence bandwidth, doppler spread versus coherence time and the condition of resolvable paths are discussed. Several models (including Rayleigh, Rician and Nakagami channels) for multipath fading channels are described and theoretical measures are included for model verification.

Chapters 5 and 6 address the combined source and channel coding respectively to image and video, each by giving a specific example. For images, a method of unequal error protection is presented to SPIHT-encoded image bitstreams according to their contribution to the overall PSNR, followed by 2 simple error concealment methods for the decoded images at the receiver side. For video, a method of unequal error protected H263 video bitstreams over mobile channel (Gaussian, Rayleigh and Rician fading channels) is presented using error resilient positional channel code. The unequal error protection is performed according to the classification of significance in H263 bitstreams. Error concealment methods, both in the frequency domain and the temporal domain, are also applied.

Chapter 7 briefly addresses the fundamentals of multiple access in spread spectrum communications, including CDMA, TDMA, FDMA and other alternative multiple access schemes such as SDMA and ODMA.

Chapter 8 describes future generation wireless video communication systems, such as video over spread spectrum channel and digital television broadcasting as well as wavelet for video transmission over radio channels.

The book includes an interesting list of contents for wireless video communications. It is certainly not easy to write a book that includes all aspects from source and channel video coding to wireless video communications with sufficient depth on the theories and practical applications.

From this point of view, this book is uniquely good. The book can serve as a good reference book for engineers and researchers who are interested in video communications. It can also serve as a text book for a post-graduate student course.

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