Handbook of Image & Video Processing

EDITOR AL BOVIK

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6.1

Basic Concepts and Techniques of Video Coding and the H.261 Standard

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Introduction

subject of video coding is of fundamental importance to ny areas in engineering and the sciences. Video engineer- is quickly becoming a largely digital discipline. The digi- transmission of television signals via satellites is common- e, and widespread HDTV terrestrial transmission is slated begin in 1999. Video compression is an absolute require- nt for the growth and success of the low-bandwidth trans- sion of digital video signals. Video encoding is being used rever digital video communications, storage, processing, ac- sition, and reproduction occur. The transmission of high- lity multimedia information over high-speed computer net- rks is a central problem in the design of *Quality of Services* S) for digital transmission providers. The *Motion Pictures rt Group* (MPEG) has already finalized two video coding ndards, MPEG-1 and MPEG-2, that define methods for the mission of digital video information for multimedia and vision formats. MPEG-4 is currently addressing the trans- sion of very low bitrate video. MPEG-7 is addressing the ndardization of video storage and retrieval services (Chap- 9.1 and 9.2 discuss video storage and retrieval). A central aspect to each of the MPEG standards are the video encoding and decoding algorithms that make digital video applications practical. The MPEG Standards are discussed in Chapters 6.4 and 6.5.

Video compression not only reduces the storage requirements or transmission bandwidth of digital video applications, but it also affects many system performance tradeoffs. The design and selection of a video encoder therefore is not only based on its ability to compress information. Issues such as bitrate versus distortion criteria, algorithm complexity, transmission channel characteristics, algorithm symmetry versus asymmetry, video source statistics, fixed versus variable rate coding, and standards compatibility should be considered in order to make good encoder design decisions.

The growth of digital video applications and technology in the past few years has been explosive, and video compression is playing a central role in this success. Yet, the video coding discipline is relatively young and certainly will evolve and change significantly over the next few years. Research in video coding has great vitality and the body of work is significant. It is apparent that this relevant and important topic will have an immense affect on the future of digital video technologies.

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