

Handbook of
**Image
& Video
Processing**

EDITOR AL BOVIK



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Handbook of **Image & Video** Processing

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Academic Press Series in Communications, Networking, and Multimedia

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6.1

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1 Introduction

The subject of video coding is of fundamental importance to many areas in engineering and the sciences. Video engineering is quickly becoming a largely digital discipline. The digital transmission of television signals via satellites is commonplace, and widespread HDTV terrestrial transmission is slated to begin in 1999. Video compression is an absolute requirement for the growth and success of the low-bandwidth transmission of digital video signals. Video encoding is being used wherever digital video communications, storage, processing, acquisition, and reproduction occur. The transmission of high-quality multimedia information over high-speed computer networks is a central problem in the design of *Quality of Services* (QoS) for digital transmission providers. The *Motion Pictures Expert Group* (MPEG) has already finalized two video coding standards, MPEG-1 and MPEG-2, that define methods for the transmission of digital video information for multimedia and television formats. MPEG-4 is currently addressing the transmission of very low bitrate video. MPEG-7 is addressing the standardization of video storage and retrieval services (Chapters 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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