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Editorial

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Recent years have seen the emergence of a variety of new multimedia (text, speech, music, image, graphics, and video) services, which accompanied an unprecedented explosion in the capacity and universal availability of networks. This evolution raised considerable challenges in the area of signal processing, where new algorithms are needed for efficient manipulation, analysis, interactive accessing, compression, storage, indexing, watermarking, and communication of multimedia signals, as well as the associated problems of hardware implementation, database management, understanding of human perception, and so on. Not surprisingly, the field of multimedia signal processing (MMSP) has been experiencing progress at a rapid pace. As evident from the above partial lists of signals and research problems, MMSP involves a diverse research community with complementary areas of expertise. Hence the continuing need for cross-fertilization and exchange of ideas, which also motivates the present collection of research papers.

This special issue offers a sample of current research in several areas of MMSP. It grew out of the October 2001 IEEE Workshop on Multimedia Signal Processing, and is a collection of invited papers that were selected to provide full treatment of work whose preliminary presentation at the workshop generated considerable interest. In particular, the areas of audio signal recognition and compression; human-machine interaction; image watermarking; video indexing; and video coding and streaming are covered.

The first group of three papers is dedicated to algorithms for audio signal compression, classification, and human-machine interaction. In *Musical Instrument Timbres Classification with Spectral Features*, G. Agostini, M. Longari, and E. Pollastri propose a framework for the classification and recognition of musical instruments based on monophonic music signals. In *Sinusoidal Analysis-Synthesis of Audio Using Perceptual Criteria*, T. Painter and A. Spanias present a new method for the selection of sinusoidal components for use in compact representation of narrowband audio. Finally, in *An Acoustic Human-Machine Front-End for Multimedia Applications*, W. Herbordt, H. Buchner, and W. Kellermann address the problem of stereophonic acoustic echo cancellation.

The fourth paper entitled *Embedding Color Watermarks in Color Images*, by C.-H. Chou and T.-L. Wu, focuses on image watermarking with particular emphasis on color information, which has not been given enough consideration in the literature.

The next group of two papers is concerned with video indexing, which is crucial to the management of, navigation in, and retrieval from large databases. The paper *Retrieval by Local Motion*, by B. Erol and F. Kossentini, focuses on the important role of local motion in indexing. It proposes two new descriptors that capture the local motion of the video object within its bounding box. I. Yahiaoui, B. Huet, and B. Merialdo present a comparison of methodologies for automatic generation of video summaries in *Comparison of Multiepisode Video Summarization Algorithms*.

The last group of three papers addresses various aspects of video coding and transmission and focuses on source-channel coding optimization or compression-complexity tradeoffs. In *3D Scan-Based Wavelet Transform and Quality Control for Video Coding*, C. Parisot, M. Antonini, and M. Barlaud propose a new temporal scan-based wavelets that maintain the central advantages of wavelet coding without recourse to excessive complexity. The next paper, *Combined Wavelet Video Coding and Error Control for Internet Streaming and Multicast*, by T. Chu and Z. Xiong, is also concerned with wavelet video coding and proposes an integrated (compression and error control) approach to Internet video streaming and multicast. The last paper, by D. Comas R. Singh, A. Ortega, and F. Marqués, entitled *Unbalanced Multiple*

Description Video Coding Based on a Rate-Distortion Optimization tackles the problem of robust streaming of video data over best-effort packet networks, using the multiple description paradigm.

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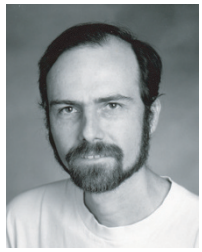
Jean-Luc Dugelay was born in Rouen (Normandy, France) in 1965. He joined the Eurécom Institute (Sophia Antipolis) in 1992, where he is currently a Professor in charge of image and video research and teaching activities inside the Multimedia Communications Department. Previously, he was a Ph.D. candidate at the Department of Advanced Image Coding and Processing at France Telecom Research in Rennes (Brittany, France), where he worked on stereoscopic TV and 3D motion estimation. He received his Ph.D. degree from the University of Rennes in 1992. His main and current research interests are in the area of multimedia signal processing; in particular, security imaging (i.e., watermarking and biometrics) and virtual imaging (i.e., realistic face cloning). His group is currently involved in several national and European projects related to multimedia signal processing. Jean-Luc Dugelay's recent professional activities include: Associate Editor of the IEEE Trans. on Image Processing, of the IEEE Trans. on Multimedia, and of the Journal *Multimedia Tools and Applications*; Guest Editor of several special issues in national and international journals. He is a senior member of the IEEE Signal Processing Society, Multimedia Signal Processing Technical Committee (IEEE MMSP TC), and Image and Multidimensional Signal Processing (IEEE IMDSP TC). Jean-Luc Dugelay was a tutorial and invited speaker for several conferences including IEEE PCM 2001 and ACM MM 2002. He serves as a Consultant for several major companies; in particular, France Telecom R & D and STMicroelectronics.



Kenneth Rose received his Ph.D. degree in electrical engineering from Caltech in 1991. He then joined the Department of Electrical and Computer Engineering, University of California at Santa Barbara, where he is currently a Professor. His research activities are in the areas of information theory, signal compression, source-channel coding, image/video coding and processing, pattern recognition, and nonconvex optimization. He is particularly interested in the application of information and estimation theoretic approaches to fundamental problems in signal processing. Recent research contributions of his group include methods for end-to-end distortion estimation in video transmission and streaming over lossy packet networks, optimal prediction in scalable video and audio coding, as well as information theoretic approaches to optimization with applications in pattern recognition, signal compression and content-based search and retrieval from high-dimensional databases. His optimization algorithms have been adopted by others in numerous disciplines beside electrical engineering and computer science, including physics, chemistry, biology, medicine, materials, astronomy, geology, psychology, linguistics, ecology, and economics. Dr. Rose is a Fellow of the IEEE. He currently serves as an Editor of source-channel coding for the IEEE Transactions on Communications. In 1990, he received (with A. Heiman) the William R. Bennett Prize Paper Award from the IEEE Communications Society.