

Distributed Multiple Description Coding

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Principles, Algorithms and Systems

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Preface

In the past decade or so, there have been fascinating developments in image and video compression. The establishment of many international standards by ISO/MPEG and ITU-T laid the common groundwork for different vendors and content providers. The explosive growth of the network, multimedia, and wireless is fundamentally changing the way people communicate with each other. Real-time reliable transmission of image and video has become an inevitable demand. As we all know, due to bandwidth and time limitation, highly efficient compression must be applied to the original data. However, lower ability of wireless terminals, network congestion, as well as network heterogeneity have posed great challenges on the conventional image and video compression coding.

To address the problems, two novel techniques, distributed video coding (DVC) and multiple description coding (MDC), are illustrated in this book. DVC can effectively reduce the complexity of conventional encoders, so as to meet the lower capacity of wireless terminals, and MDC can realize the reliable transmission over error-prone channels.

This book is dedicated for addressing the DVC and MDC issues in a systematic way. After giving a state-of-the-art survey, we propose some novel DVC and MDC improvements for image and video transmission, with an attempt to achieve better performance. For each DVC and MDC approach, the main idea and corresponding algorithms design are elaborated in detail.

This book covers the fundamental concepts and the core technologies of DVC and MDC, especially its latest developments. Each chapter is presented in a self-sufficient and independent way so that the reader can select the chapters interesting to them. The methodologies are described in detail so that the readers can repeat the corresponding experiments easily.

For researchers, it would be a good book for inspiring new ideas about the novel DVC and MDC technologies, and a quick way to learn new ideas from the current status of DVC and MDC. For engineers, it would be a good guidebook to develop practical applications for DVC and MDC system.

Chapter 1 provides a broad overview of DVC and MDC, from basic ideas to the current research. Chapter 2 focuses on the principles of MDC, such as

sub-sampling based MDC, quantization based MDC, transform based MDC, and FEC based MDC. Chapter 3 presents the principles of DVC, mainly including Slepian-Wolf coding based on Turbo and LDPC respectively and comparing the relative performance. Chapters 4 and 5 are devoted to the algorithms of MDC and DVC, mainly focusing on the current research fruits of the authors. We provide the basic frameworks and the experimental results, which may help the readers improve the efficiency of MDC and DVC. Chapter 6 introduces the classical DVC system for mobile communications, providing the developmental environment in detail.

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We are very much grateful to the Springer in-house editors, Simon Rees (Associate Editor) and Wayne Wheeler (Senior Editor), for the editorial assistance and excellent cooperative collaboration to produce this important scientific work. We hope that the reader will share our excitement to present this book and will find it useful.

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