BOOK REVIEW

Digital Color Management Encoding Solutions, Second Edition

Edward J. Giorgianni and Thomas E. Madden, 415 pp., ISBN 978-0-470-51244-9, John Wiley & Sons, (2008), $140.00 hardcover.

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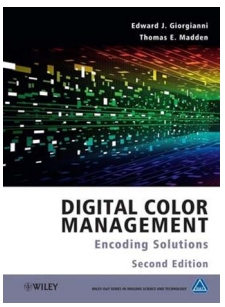

This book focuses specifically on color management. Most books addressing color imaging discuss human vision and models of human vision more than the implications for color management. Often, questions of how to manage the communication of color through a complex imaging system are left as an exercise for the engineer. The unusual focus of this book makes it more welcome, as it complements other works in the area and provides valuable experience-based insight into a complex challenge.

The book is organized into five main sections, the fifth of which is a set of appendices. The first section provides a brief introduction to color-imaging systems, including human color vision as an example system. The discussion is very concise and includes appropriate references to other books, rather than allocating hundreds of pages to the standard discussion of color vision and colorimetry.

The second section contains five chapters on the nature of color images, discussing the main technologies involved in different color-management scenarios: electronic displays, electronic-imaging systems (capture through to display), reflection prints, projected images, and finally photographic negatives. Discussion in each chapter focuses on how the color of the reproduction compares with the colorimetry of the starting image. Multiple image capture and image-viewing scenarios are used to show that different scenarios require different relationships between the colorimetry of the input and the colorimetry of the reproduction.

The third section includes seven chapters on digital color encoding and is the largest section in the book. Here the authors discuss various methods of color encoding, explaining why and when they work, as well as mentioning when they do not work. Early on, the authors introduce a distinction between a color-encoding method (the meaning of the encoded colors) and a color-encoding metric (such as CIELAB). This distinction clarifies the problems addressed by a color-encoding metric and problems not addressed by the color-encoding metric. The section closes with a chapter on myths and misconceptions associated with color management, clearly explaining the hope and the fallacy behind each myth.

The fourth section presents a nine-chapter discussion of a unified color management environment. This section presents the core of the authors' message: that a comprehensive color-management system must be able to communicate color appearance, not just colorimetry, through an imaging system. The authors show that by combining colorimetry and specification of viewing conditions under which the colorimetry applies, a comprehensive system can be developed that will reliably communicate color throughout a complex system, supporting a wide range of viewing conditions. By using colorimetry (which is well established) and a viewing environment specification, they leave room for color appearance models to evolve and improve without significantly altering the fundamental architecture of the system.

The fifth section includes nine appendices that provide background and detail on a number of topics, including colorimetry, photographic media, adaptation, viewing flare, and color transforms. Finally, there is a glossary and a very helpful list for suggested reading.

This book consistently focuses on the needs and goals of color management, building from examples of real systems to develop a comprehensive architecture for color management. Examples are used to make each point, focusing on the purpose of color management more than simply the mathematics of color transforms or the technology of color reproduction. Focusing the discussion this way and moving some of the mathematics to appendices helps the reader move from point to point without getting distracted by math or technology. The book proceeds in a logical progression from basic colorimetry through to development of a comprehensive environment for color management. This book deserves to be read in order. Simply reading a couple of different chapters is unlikely to provide as much benefit to the reader as going through the whole book. To support readers of varying backgrounds, each chapter concludes with a list of key points. The authors suggest a reader choosing to skim or skip a chapter should at least review the key points made in that chapter before moving to the next chapter.

The writing is extremely clear, well paced, and well illustrated. The authors write from a very strong background, having direct experience with nearly every color-imaging system in use: film (optically printed and scanned), digital capture, printing, projection images (slides and motion picture), and electronic displays. Their experience with all of these systems provides a background that is both broad and deep when they explain the limitations of many color-management systems and propose a comprehensive color-management environment.

The technology and adoption of color-management systems have both progressed significantly since the first edition of this book appeared in 1998. The second edition is significantly expanded and updated, including recent systems and color metrics in examples. Additional material that isn't new but is still very helpful is also included, such as an appendix on color primary conversions. The organization of the material has also improved with the new edition. The book is also remarkably clean from typos and mistakes–the reviewer has found only a single typo in an appendix.

Bruce H. Pillman is a senior principal scientist in the Computational Science and Technology Research group in the Kodak Research Laboratories. He has experience with hybrid digital imaging systems (scanning film and prints) and digital cameras. His interests include modeling of image quality, image chain analysis and design, development of algorithms for automatic camera control, and image enhancement algorithms. He holds eight patents in digital imaging, focusing primarily on color digital cameras.