

Chapter 11 Digital Image Processing Jensen

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[Digital Image Processing](#) Springer Science & Business Media

Ever since television became practical in the early 1950s, closed-circuit television (CCTV) in conjunction with the light microscope has provided large screen display, raised image contrast, and made the images formed by ultraviolet and infrared rays visible. With the introduction of large-scale integrated circuits in the last decade, TV equipment has improved by leaps and bounds, as has its application in microscopy. With modern CCTV, sometimes with the help of digital computers, we can distill the image from a scene that appears to be nothing but noise; capture fluorescence too dim to be seen; visualize structures far below the limit of resolution; crisp images hidden in fog; measure, count, and sort objects; and record in time-lapsed and high-speed sequences through the light microscope without great difficulty. In fact, video is becoming indispensable for harnessing the fullest capacity of the light microscope, a capacity that itself is much greater than could have been envisioned just a few years ago. The time seemed ripe then to review the basics of video, and of microscopy, and to examine how the two could best be combined to accomplish these tasks. The Marine Biological Laboratory short courses on Analytical and Quantitative Light Microscopy in Biology, Medicine, and the Materials Sciences, and the many inquiries I received on video microscopy, supported such an effort, and Kirk Jensen of Plenum Press persuaded me of its worth.

[Methodologies and Applications](#) Morgan & Claypool Publishers

The subject of digital image processing has migrated from a graduate to a junior or senior level course as students become more proficient in mathematical background earlier in their college education. With that in mind, Introduction to Digital Image Processing is simpler in terms of mathematical derivations and eliminates derivations of advanced s

[Mathematical and Computational Methods](#) Springer Science & Business Media

Written from an engineering perspective, this book incorporates a thorough theoretical introduction to the underlying disciplines via its treatment of a generic machine vision system model. Dedicated chapters introduce image acquisition techniques matched to constrained environments, image processing, segmentation, feature extraction, pattern classification (including neural approaches) and interpreting two-dimensional views of the three-dimensional world. It is richly illustrated with case studies of image processing in a wide range of application domains.

[Digital Image Processing](#) Academic Press

This lecture provides a hands-on glimpse of the field of electrical and computer engineering. The broad range of hands-on applications utilize LabVIEW and the NI-SPEEDY-33 hardware to explore concepts such as basic computer input and output, basic robotic principals, and introductory signal processing and communication concepts such as signal generation, modulation, music, speech, and audio and image/video processing. These principals and technologies are introduced in a very practical way and are fundamental to many of the electronic and computerized devices we use today. Some examples include audio level meter and audio effects, music synthesizer, real-time autonomous robot, image and video analysis, and DTMF modulation found in touch-tone telephone systems. Table of Contents: Getting Familiar with LabVIEW and SPEEDY-33 / Applications using LEDs and Switches using the SPEEDY-33 / Noise Removal / Music Equalizer / Telephone / Digital Audio Effects: Echo and Reverb / Music Composer / Introduction to Robotics / AM Radio / Modem / Digital Image Processing Fundamentals / Applications using USB Camera / Appendix: VIs at a Glance

[Real-Time Digital Signal Processing](#) Elsevier Health Sciences

Similar to the way in which computer vision and computer graphics act as the dual fields that connect image processing in modern computer science, the field of image processing can be considered a crucial middle road between the vision and graphics fields. Research Developments in Computer Vision and Image Processing: Methodologies and Applications brings together various research methodologies and trends in emerging areas of application of computer vision and image processing. This book is useful for students, researchers, scientists, and engineers interested in the research developments of this rapidly growing field.

[Digital Image Processing](#) CRC Press

The fields of computer vision and image processing are constantly evolving as new research and applications in these areas emerge. Staying abreast of the most up-to-date developments in this field is necessary in order to promote further research and apply these developments in real-world settings. Computer Vision and Image Processing in Intelligent Systems and Multimedia Technologies features timely and informative research on the design and development of computer vision and image processing applications in intelligent agents as well as in

multimedia technologies. Covering a diverse set of research in these areas, this publication is ideally designed for use by academicians, technology professionals, students, and researchers interested in uncovering the latest innovations in the field.

[Digital Image Processing for Medical Applications](#) Springer Science & Business Media

In recent years, Moore's law has fostered the steady growth of the field of digital image processing, though the computational complexity remains a problem for most of the digital image processing applications. In parallel, the research domain of optical image processing has matured, potentially bypassing the problems digital approaches were suffering and bringing new applications. The advancement of technology calls for applications and knowledge at the intersection of both areas but there is a clear knowledge gap between the digital signal processing and the optical processing communities. This book covers the fundamental basis of the optical and image processing techniques by integrating contributions from both optical and digital research communities to solve current application bottlenecks, and give rise to new applications and solutions. Besides focusing on joint research, it also aims at disseminating the knowledge existing in both domains. Applications covered include image restoration, medical imaging, surveillance, holography, etc... "a very good book that deserves to be on the bookshelf of a serious student or scientist working in these areas." Source: Optics and Photonics News

[An Algorithmic Introduction Using Java](#) CRC Press

This easy-to-follow textbook provides a modern, algorithmic introduction to digital image processing. It concentrates on practical applications and working implementations whilst also presenting important formal details and the necessary mathematics.

[Digital Radiography and PACS - E-Book](#) Springer

Crime Scene Photography, Third Edition, covers the general principles and concepts of photography, while also delving into the more practical elements and advanced concepts of forensic photography. Robinson assists the reader in understanding and applying essential concepts in order to create images that are able to withstand challenges in court. This text is a required reading by both the International Association for Identification's Crime Scene Certification Board and the Forensic Photography Certification Board. Includes an instructor website with lecture slides, practical exercises, a test bank, and image collection and many videos which can be used. Extensively illustrated with over 1000 full color photographs, with many images entirely new for the third edition Over 100 practical exercises help the reader grasp the practical applications Variations of correct and incorrect approaches, to be used alongside practical exercises, available online in the Instructor's Manual The chapter on Special Photographic Situations includes new sections on autopsy photography, images from drones, recommendations to photographically document bloodstain patterns and firearms trajectories

[Digital Filtering in One and Two Dimensions](#) John Wiley & Sons

The ability to manipulate and analyze pictorial information to improve medical diagnosis, monitoring, and therapy via imaging is a valuable tool that every professional working in radiography, medical imaging, and medical physics should utilize. However, previous texts on the subject have only approached the subject from a programming or computer s

[Remote Sensing](#) IGI Global

Digital image processing and analysis is a field that continues to experience rapid growth, with applications in many facets of our lives. Areas such as medicine, agriculture, manufacturing, transportation, communication systems, and space exploration are just a few of the application areas. This book takes an engineering approach to image processing and analysis, including more examples and images throughout the text than the previous edition. It provides more material for illustrating the concepts, along with new PowerPoint slides. The application development has been expanded and updated, and the related chapter provides step-by-step tutorial examples for this type of development. The new edition also includes supplementary exercises, as well as MATLAB-based exercises, to aid both the reader and student in development of their skills.

[Digital Image Processing](#) Cambridge University Press

Written with the radiography student in mind, Digital Radiography and PACS, 2nd Edition provides the latest information on digital imaging systems, including computed radiography (CR), digital radiography (DR), and picture archiving and communications systems (PACS) as well as the data required by practicing technologists who are transitioning to digital imaging. Coverage of digital imaging and PACS is at just the right level for student radiographers and practicing technologists who are transitioning to digital imaging. Chapter outlines, learning objectives and key terms at the beginning of each chapter orient readers to the chapter content and assist with organizing study and comprehension. Bulleted summaries recap the main points of the chapter, ensuring you focus on the most important concepts conveyed by the chapter. Review questions at the end of each chapter are linked to the chapter objectives. The latest on CR and DR function and image enhancement and processing based on recently published research keeps you current with today's imaging requirements. Complete coverage of PACS workstations, archiving solutions and system architectures provides a sound basis for understanding how individual systems work. Comprehensive quality control and management guidelines for PACS, CR and DR prepare you for on the job success. Careful alignment with digital imaging information required by the ASRT Core Curriculum ensures you are current with today's procedures and modalities.

[Digital Image Processing](#) Macmillan International Higher Education

This authoritative text (the second part of a complete MSc course) provides mathematical methods required to describe images, image formation and different imaging systems, coupled with the principle techniques used for processing digital images. It is based on a course for postgraduates reading physics, electronic engineering, telecommunications engineering, information technology and computer science. This book relates the methods of processing and interpreting digital images to the 'physics' of imaging systems. Case studies reinforce the methods discussed, with examples of current research themes. Provides mathematical methods required to describe images, image formation and different imaging systems Outlines the principle techniques used for processing digital images Relates the methods of processing and interpreting digital images to the 'physics' of imaging systems

[Multimedia Signals and Systems](#) Oxford University Press

This book covers the technology of digital image processing in various fields with big data and their applications. Readers will understand

various technologies and strategies used in digital image processing as well as handling big data, using machine-learning techniques. This book will help to improve the skills of students and researchers in such fields as engineering, agriculture, and medical imaging. There is a need to be able to understand and analyse the latest developments of digital image technology. As such, this book will cover:

- Applications such as biomedical science and biometric image processing, content-based image retrieval, remote sensing, pattern recognition, shape and texture analysis
- New concepts in color interpolation to produce the full color from the sub-pattern bare pattern color prevalent in today's digital cameras and other imaging devices
- Image compression standards that are needed to serve diverse applications
- Applications of remote sensing, medical science, traffic management, education, innovation, and analysis in agricultural design and image processing
- Both soft and hard computing approaches at great length in relation to major image processing tasks
- The direction and development of current and future research in many areas of image processing
- A comprehensive bibliography for additional research (integrated within the framework of the book)

This book focuses not only on theoretical and practical knowledge in the field but also on the traditional and latest tools and techniques adopted in image processing and data science. It also provides an indispensable guide to a wide range of basic and advanced techniques in the fields of image processing and data science.

Digital Media Processing Springer Science & Business Media

This long-established and well-received monograph offers an integral view of image processing - from image acquisition to the extraction of the data of interest – written by a physical scientists for other scientists. Supplements discussion of the general concepts is supplemented with examples from applications on PC-based image processing systems and ready-to-use implementations of important algorithms. Completely revised and extended, the most notable extensions being a detailed discussion on random variables and fields, 3-D imaging techniques and a unified approach to regularized parameter estimation. Complete text of the book is now available on the accompanying CD-ROM. It is hyperlinked so that it can be used in a very flexible way. CD-ROM contains a full set of exercises to all topics covered by this book and a runtime version of the image processing software heurisko. A large collection of images, image sequences, and volumetric images is available for practice exercises

Digital Image Processing and Analysis Elsevier

Digital holography and digital image processing are twins born by computer era. They share origin, theoretical base, methods and algorithms. The present book describes these common fundamentals principles, methods and algorithms including image and hologram digitization, data compression, digital transforms and efficient computational algorithms, statistical and Monte-Carlo methods, image restoration and enhancement, image reconstruction in tomography and digital holography, discrete signal resampling and image geometrical transformations, accurate measurements and reliable target localization in images, recording and reconstruction of computer generated holograms, adaptive and nonlinear filters for sensor signal perfecting and image restoration and enhancement. The book combines theory, heavily illustrated practical methods and efficient computational algorithms and is written for senior-level undergraduate and graduate students, researchers and engineers in optics, photonics, opto-electronics and electronic engineering.

Advances in Spatial Data Handling and GIS Taylor & Francis

Following the successful publication of the 1st edition in 2009, the 2nd edition maintains its aim to provide an application-driven package of essential techniques in image processing and GIS, together with case studies for demonstration and guidance in remote sensing applications. The book therefore has a “ 3 in 1 ” structure which pinpoints the intersection between these three individual disciplines and successfully draws them together in a balanced and comprehensive manner. The book conveys in-depth knowledge of image processing and GIS techniques in an accessible and comprehensive manner, with clear explanations and conceptual illustrations used throughout to enhance student learning. The understanding of key concepts is always emphasised with minimal assumption of prior mathematical experience. The book is heavily based on the authors’ own research. Many of the author-designed image processing techniques are popular around the world. For instance, the SFIM technique has long been adopted by ASTRIUM for mass-production of their standard “ Pan-sharpen ” imagery data. The new edition also includes a completely new chapter on subpixel technology and new case studies, based on their recent research.

DSP Algorithms Using C Laxmi Publications

This book has been conceived to extend the generally published work on one- and two-dimensional digital filters in order to include some of the more recently developed ideas. It is intended to supplement and build on the classical books which cover the fundamental concepts of the topic. As a consequence of this, the basic theory is stated in a compact manner and is not developed thoroughly, as this would result in considerable duplication of existing books. The main theme of the book has been to provide a comprehensive background to the methods available for the realization of both recursive and nonrecursive digital filters, and to give an insight into some of the more recent implementation procedures. The book is planned to cover one- and two-dimensional systems in parallel, showing the techniques which are applicable in both areas, and also the limitations and constraints necessary when a one-dimensional technique is extended to systems of higher dimensionality. The theme of the book commences with several chapters on the design of filter transfer functions to meet given specifications. This is followed by a discussion of methods of implementing these in a practical system and the limitations imposed as a result of noise and finite word length. Finally, a discussion of some applications is included.

Digital Image Processing and Pattern Recognition Springer Science & Business Media

Highly Regarded, Accessible Approach to Image Processing Using Open-Source and Commercial Software A Computational Introduction to Digital Image Processing, Second Edition explores the nature and use of digital images and shows how they can be obtained, stored, and displayed. Taking a strictly elementary perspective, the book only covers topics that involve simple mathematics yet offer a very broad and deep introduction to the discipline. New to the Second Edition This second edition provides users with three different computing options. Along with MATLAB®, this edition now includes GNU Octave and Python. Users can choose the best software to fit their needs or migrate from one system to another. Programs are written as modular as possible, allowing for greater flexibility, code reuse, and conciseness. This edition also contains new images, redrawn diagrams, and new discussions of edge-preserving blurring filters, ISODATA thresholding, Radon transform, corner detection, retinex algorithm, LZW compression, and other topics. Principles, Practices, and Programming Based on the author’s successful image processing courses, this bestseller is suitable for classroom use or self-study. In a straightforward way, the text illustrates how to implement imaging techniques in MATLAB, GNU Octave, and Python. It includes numerous examples and exercises to give students hands-on practice with the material.

Image Processing, Analysis, and Machine Vision Digital Image Processing for Medical Applications

This book introduces the fundamental concepts of modern digital image processing. It aims to help the students, scientists, and practitioners to understand the concepts through clear explanations, illustrations and examples. The discussion of the general concepts is supplemented with examples