Introduction To Hyperspectral Image Analysis

Hyperspectral Imaging Analysis: Including the Spatial Domain Signal Theory Methods in Multispectral Remote Sensing Techniques for Spectral Detection and Classification is an outgrowth of the research conducted over the years in the Remote Sensing Signal and Image Processing Laboratory (RSSIPL) at the University of Maryland, Baltimore County. It explores applications of statistical signal processing to hyperspectral imaging and further develops non-linear (spectral) techniques for subpixel detection and mixed pixel classification. This text is the first of its kind on the topic and can be considered a recipe book offering various techniques for hyperspectral data exploitation. In particular, some known techniques, such as OSP (Orthogonal Subspace Projection) and CEM (Constrained Energy Minimization) that were previously developed in the RSSIPL, are discussed in great detail. This book is self-contained and can serve as a valuable and useful reference for researchers in academia and practitioners in government and industry.

Principles of Evolution Remote Sensing Image Analysis is mostly done using only spectral information on a pixel by pixel basis. Information captured in neighboring pixels, or information about patterns surrounding the pixel of interest, is often of great assistance. This book presents a wide range of innovative and advanced image processing methods for including spatial information, captured by neighboring pixels in remotely sensed images, to improve image interpretation or image classification. Presented methods include different types of variogram analysis, various methods for texture quantification, smart kernel operators, pattern recognition techniques, image segmentation methods, sub-pixel image methods, wavelets and advanced spectral mixture analysis techniques. Apart from explaining the working methods in detail, a wide range of applications is presented covering land cover and land use mapping, environmental applications such as heavy metal pollution, urban mapping and geological applications to detect hydrocarbon seeps. The book is meant for professionals, PhD students and graduates who use remote sensing image analysis, image interpretation and image classification in their work related to disciplines such as geography, geology, botany, ecology, forestry, cartography, soil science, environmental and urban and regional planning.

Hyperspectral Imaging Analysis and Applications for Food Quality In processing food, hyperspectral imaging, combined with intelligent software, enables digital sorters or optical sorters to identify and remove defects and foreign material that are invisible to traditional camera and laser sorters. Hyperspectral Imaging Analysis and Applications for Food Quality explores the theoretical and practical issues associated with the development, analysis, and application of essential image processing algorithms in order to exploit hyperspectral imaging for food quality evaluation. It outlines strategies and essential image processing routines that are necessary for making the appropriate decision during detection, classification, identification, quantification, and/or prediction processes. Features: Covers practical issues associated with the development, analysis, and application of essential image processing for food quality applications. Surveys the breadth of different image processing approaches adopted over the years in attempting to implement hyperspectral imaging for food quality monitoring. Explains the working principles of hyperspectral systems as well as the basic concept and structure of hyperspectral data. Describes the different approaches used during image acquisition, data collection, and visualization. The book is divided into three sections. Section I discusses the fundamentals of imaging systems. How can hyperspectral image cube acquisition be optimized? Also, two chapters deal with image segmentation, data extraction, and treatment. Seven chapters comprise Section II, which deals with Chemometrics. One explains the fundamentals of multivariate analysis and techniques while in six other chapters the reader will find information on and applications of a number of chemometric methods.
Real-Time Progressive Hyperspectral Image Processing

Hyperspectral remote sensing is an emerging, multidisciplinary field with diverse applications that builds on the principles of material spectroscopy, radiative transfer, imaging spectrometry, and hyperspectral data processing. While there are many resources that suitably cover these areas individually and focus on specific aspects of the hyperspectral remote sensing field, this book provides a holistic treatment that thoroughly captures its multidisciplinary nature. The content is oriented toward the physical principles of hyperspectral remote sensing as opposed to applications of hyperspectral technology. Readers can expect to finish the book armed with the required knowledge to understand the immense literature available in this technology area and apply their knowledge to the understanding of material spectral properties, the design of hyperspectral systems, the analysis of hyperspectral imagery, and the application of the technology to specific problems.

Processing and Analysis of Hyperspectral Image Data This book constitutes the thoroughly refereed post-conference proceedings of the 5th International Conference on Knowledge, Information, and Creativity Support Systems, KCIS 2010, held in Chang Mai, Thailand, in November 2010. The 23 revised full papers presented were carefully reviewed and selected from 72 submissions. The papers cover a broad range of topics related to all knowledge science-related areas including creativity support, decision science, knowledge science, data mining, machine learning, databases, statistics, knowledge acquisition, automatic scientific discovery, data/knowledge visualization, and knowledge-based systems.


Hyperspectral Remote Sensing The quantity of visual information encountered experimentally by scientists across a wide range of fields has grown dramatically in recent years. As a result, the importance of dealing with multivariate data (data obtained by measuring a number of different quantities simultaneously) present in images has become much more important, and the requirement for techniques which are able to manage and analyse these data has become crucial for the practising scientist in many diverse disciplines. Multivariate Image Analysis gives the reader a sound understanding of the importance of, and the principles behind, multivariate image analysis. A short introduction to the image and its perception is followed by a discussion of some popular techniques of multivariate image formation, taken from fields such as microscopy, remote sensing and medical imaging. The principles behind one of the key multivariate techniques, principal components analysis, are thoroughly explained without going too far into the theory. The important concepts of residual visualization and local modelling are explained. Throughout, the power of the techniques discussed is demonstrated with the use of simple worked examples to illustrate the concepts, and more complex examples to indicate to the reader how a complete analysis would be carried out. The book is richly illustrated with colour images. Multivariate Image Analysis is of great interest to all those involved in the analysis of data contained in complex images. The techniques discussed are widely applicable, and are finding use in fields such as microscopy, satellite remote sensing, medical imaging, radiology, analytical chemistry, spectroscopy and astronomy.

Knowledge, Information, and Creativity Support Systems Authored by a panel of experts in the field, this book focuses on hyperspectral image analysis, systems, and applications. With discussion of application-based projects and case studies, this professional reference will bring you up-to-date on this pervasive technology, whether you are working in the military and defense fields, or in remote sensing technology, geoscience, or agriculture.

Hyperspectral Satellites and System Design Understand the seminal principles, current techniques, and tools of imaging spectroscopy with this self-contained introductory guide.

Multivariate Image Analysis Hyperspectral Remote Sensing: Theory and Applications offers the latest information on the techniques, advances and wide-ranging applications of hyperspectral remote sensing, such as forestry, agriculture, water resources, soil and geology, among others. The book also presents hyperspectral data integration with other sources, such as LiDAR, Multi-spectral data, and other remote sensing techniques. Researchers who use this resource will be able to understand and implement the technology and data in their respective fields. As such, it is a valuable reference for researchers and data analysts in remote sensing and Earth Observation fields and those in ecology.
Read Free Introduction To Hyperspectral Image Analysis

agriculture, hydrology and geology. It includes the theory of hyperspectral remote sensing, along with techniques and applications across a variety of disciplines. Presents the processing, methods and techniques utilized for hyperspectral remote sensing and in-situ data collection. Provides an overview of the state-of-the-art, including algorithms, techniques and case studies.

Hyperspectral Image Analysis Land management issues, such as mapping tree species, recognizing invasive plants, and identifying key geologic features, require an understanding of complex technical issues before the best decisions can be made. Hyperspectral remote sensing is one the technologies that can help with reliable detection and identification. Presenting the fundamentals of remote sensing at an introductory level, Hyperspectral Remote Sensing: Principles and Applications explores all major aspects of hyperspectral image acquisition, exploitation, interpretation, and applications. The book begins with several chapters on the basic concepts and underlying principles of remote sensing images. It introduces spectral radiometry concepts, such as radiance, irradiance, flux, and blackbody radiation; covers imaging spectrometers, examining spectral range, full width half maximum (FWHM), resolution, sampling, signal-to-noise ratio (SNR), and multispectral and hyperspectral sensor systems; and addresses atmospheric interactions. The book then discusses information extraction, with chapters covering the underlying physics principles that lead to the creation of an image and the interpretation of the image's information. The final chapters describe case studies that illustrate the use of hyperspectral remote sensing in agriculture, environmental monitoring, forestry, and geology. After reading this book, you will have a better understanding of how to evaluate different approaches to hyperspectral analyses and to determine which approaches will work for your applications.

Hyperspectral Data Exploitation The first of its kind, this book reviews image processing tools and techniques including Independent Component Analysis, Mutual Information, Markov Random Field Models and Support Vector Machines. The book also explores a number of experimental examples based on a variety of remote sensors. The book will be useful to people involved in hyperspectral imaging research, as well as by remote sensing data like geologists, hydrologists, environmental scientists, civil engineers and computer scientists.

Hyperspectral Imaging Remote Sensing This book reviews the state of the art in algorithmic approaches addressing the practical challenges that arise with hyperspectral image analysis tasks, with a focus on emerging trends in machine learning and image processing understanding. It presents advances in deep learning, multiple instance learning, sparse representation based learning, low-dimensional manifold models, anomalous change detection, target recognition, sensor fusion and super-resolution for robust multispectral and hyperspectral image understanding. It presents research from leading international experts who have made foundational contributions in these areas. The book covers a diverse array of applications of multispectral/hyperspectral imagery in the context of these algorithms, including remote sensing, face recognition and biomedicine. This book would be particularly beneficial to graduate students and researchers who are taking advanced courses in (or are working in) the areas of image analysis, machine learning and remote sensing with multi-channel optical imagery. Researchers and professionals in academia and industry working in areas such as electrical engineering, civil and environmental engineering, geosciences and biomedical image processing, who work with multi-channel optical data will find this book useful.

New Advances in Image Fusion This book presents a detailed analysis of spectral imaging, describing how it can be used for the purposes of material identification, object recognition and scene understanding. The opportunities and challenges of combining spatial and spectral information are explored in depth, as are a wide range of applications. Features: discusses spectral image acquisition by hyperspectral cameras, and the process of spectral image formation; examines models of surface reflectance, the recovery of photometric invariants, and the estimation of the illuminant power spectrum from spectral imagery; describes spectrum representations for the interpretation of reflectance and radiance values, and the classification of spectra; reviews the use of imaging spectroscopy for material identification; explores the recovery of reflection geometry from image reflectance; investigates spectro-polarimetric imagery, and the recovery of object shape and material properties using polarimetric images captured from a single view.

Resolving Spectral Mixtures This book is completely updated, greatly expanded version of the previously successful volume by the author. The Second Edition includes new results and data, and discusses a unified framework and rationale for designing and evaluating image processing algorithms. Written from the viewpoint that image processing supports remote sensing science, this book describes physical models for remote sensing phenomenology and sensors and how they contribute to models for remote sensing data. The text then presents image processing techniques and interprets them in terms of these models. Spectral, spatial, and geometric models are used to introduce advanced image processing techniques such as hyperspectral image analysis, fusion of multisensor images, and digital elevation model extraction from stereo imagery. The material is suitable for graduate level engineering, physical and natural science courses, or practicing remote sensing scientists. Each chapter is enhanced by student exercises designed to stimulate an understanding of the material. Over 300 figures are produced specifically for this book, and numerous tables provide a rich bibliography of the research literature.

Kernel Methods for Remote Sensing Data Analysis With the widespread availability of satellite and aircraft remote sensing image data in digital form, and the ready access most remote sensing practitioners have to computing systems for image interpretation, there is a need to draw together the range of digital image processing procedures and methodologies commonly used in this field into a single treatment. It is the intention of this book to provide such a function, at a level meaningful to the non-specialist digital image analyst, but in sufficient detail that algorithm limitations, alternative procedures and current trends can be appreciated. Often the applications specialist in remote sensing wishing to make use of digital processing procedures has had to depend upon either the mathematically detailed treatments of image processing found in the electrical engineering and computer science literature, or the sometimes necessarily superficial treatments given in general texts on remote sensing. This book seeks to redress that situation. Both image enhancement and classification techniques are covered making the material relevant in those applications in which photointerpretation is used for information extraction and in those wherein information is obtained by classification.

Imaging Spectroscopy for Scene Analysis Resolving Spectral Mixtures With Applications from Ultraviolet to Infrared Time-Resolved Spectroscopy to Superresolution Imaging offers a comprehensive look into the most important models and frameworks essential to resolving the spectral unmixing problem—from multivariate curve resolution and multi-way analysis to Bayesian positive source separation and nonlinear unmixing. Unravelling total spectral data into the contributions from individual unknown components with limited prior information is a complex problem that has attracted continuous interest for almost four decades. Spectral unmixing is a topic of interest in statistics,
Read Free Introduction To Hyperspectral Image Analysis

chemometrics, signal processing, and image analysis. For decades, researchers from these fields were often unaware of the work in other disciplines due to their different scientific and technical backgrounds and interest in different objects or samples. This led to the development of quite different approaches to solving the same problem. This multi-authored book will bridge the gap between disciplines with contributions from a number of well-known and strongly active chemometric and signal processing research groups. Among chemists, multivariate curve resolution methods are preferred to extract information about the nature, amount, and location in time (process) and space (imaging and microscopy) of chemical constituents in complex samples. In signal processing, assumptions are usually around statistical independence of the extracted components. However, the chapters include the complexity of the spectral data to be unmixes as well as dimensionality and size of the data sets. Advanced spectroscopy is the key thread linking the different chapters. Applications cover a large part of the electromagnetic spectrum. Time-resolution ranges from femtosecond to second in process spectroscopy and spatial resolution covers the submicronic to macroscopic scale in hyperspectral imaging. Demonstrates how and why data analysis, signal processing, and chemometrics is essential to the spectral unmixing problem. Guides the reader through the fundamentals and details of the different methods. Presents extensive plots, graphical representations, and illustrations to help readers understand the features of different techniques and to interpret results. Bridges the gap between disciplines with contributions from a number of well-known and highly active chemometric and signal processing research groups.

Hyperspectral Remote Sensing Principles of Evolution covers all aspects of the subject. Following an introductory section that provides necessary background, it has chapters on the evidence for evolution that cover the fossil record, DNA-sequence homologies, and protein homologies (exode). It also includes a full history of life from the first universal common ancestor, through the rise of the eukaryote and on to the major groups of phyla. This section is followed by one on the mechanism of evolution with chapters on variation, selection and speciation. The main part of the book ends with a chapter on human evolution and this is followed by appendices that expand on the making of fossils, the history of the subject and creationism. What makes this book different from others on evolution is its systems biology perspective. This new area focuses on the role of protein networks and on multi-level complexity, and is used in three contexts. First, most biological activity is driven by such networks and this has direct implications for understanding exode and for seeing how variation is initiated, mainly during embryogenesis. Second, it provides the natural language for discussing phylodynamics. Third, evolutionary change involves events at levels ranging from the genome to the ecosystem and systems biology provides a context for integrating material of this complexity. The book assumes a basic grounding in biology but little mathematics as the difficult subject of evolutionary population genetics is mainly covered qualitatively, with major results being derived and used rather than derived. Principles of Evolution will be an interesting and thought-provoking text for undergraduates and graduates across the biological sciences.

Advancements in Computer Vision and Image Processing This book is about the novel aspects and future trends of the hyperspectral imaging in food, agriculture, and environment. The topics covered by this book are hyperspectral imaging and their applications in the nondestructive quality assessment of fruits and vegetables, hyperspectral imaging for assessing quality and safety of meat, multimode hyperspectral imaging for food quality and safety, models fitting to pattern recognition in hyperspectral images, sequential classification of hyperspectral images, graph construction for hyperspectral data unmixing, target visualization method to process hyperspectral image, and soil contamination mapping with hyperspectral imagery. This book is a general reference work for students, professional engineers, and readers with interest in the subject.

Hyperspectral Imaging in Agriculture, Food and Environment: An outgrowth of the author’s extensive experience teaching senior and graduate level students, this is both a thorough introduction and a solid professional reference. * Material covered has been developed based on a 35-year research program associated with such systems as the Landsat satellite program and later satellite and aircraft programs. * Covers existing aircraft and satellite programs and several future programs * An Instructor’s Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Microwave Remote Sensing of Land Surfaces The two-volume set: LNCS 10484 and 10485 constitutes the refereed proceedings of the 19th International Conference on Image Analysis and Processing,ICIAP 2017, held in Catania, Italy, in September 2017. The 138 papers presented were carefully reviewed and selected from 229 submissions. The papers cover both classic and the most recent trends in image processing, computer vision, and pattern recognition, addressing both theoretical and applicative aspects. They are organized in the following topical sections: video analysis and understanding; pattern recognition and machine learning, multimedia applications, multimedia, biomedical and assistive technology; information forensics and security; imaging for cultural heritage and archaeology; and imaging solutions for improving the quality of life.

Hyperspectral Remote Sensing Kernel methods have long been established as effective techniques in the framework of machine learning and pattern recognition, and have now become the standard approach to many remote sensing applications. With algorithms that combine statistics and geometry, kernel methods have proven successful across many different domains related to the analysis of images of the Earth acquired from airborne and satellite sensors, including natural resource control, detection and monitoring of anthropic infrastructures (e.g. urban areas), agriculture inventorying, disaster prevention and damage assessment, and anomaly and target detection. Presenting the theoretical foundations of kernel methods (KMs) relevant to the remote sensing domain, this book serves as a practical guide to the design and implementation of these methods. Five distinct parts present state-of-the-art research related to remote sensing based on the recent advances in kernel methods, analysing the related methodological and practical challenges. Part I introduces the key concepts of machine learning for remote sensing, and the theoretical and practical foundations of kernel methods. Part II explores supervised image classification including: Support Vector Machines (SVMs), kernel discriminant analysis, multi-temporal image classification, target detection with kernels, and Support
Vector Data Description (SVDD) algorithms for anomaly detection. Part III looks at semi-supervised classification with transductive SVM approaches for hyperspectral image classification and kernel mean data classification. Part IV examines regression and model inversion, including the concept of a kernel unmixing algorithm for hyperspectral imagery, the theory and methods for quantitative remote sensing inverse problems with kernel-based equations, kernel-based BRDF (Bidirectional Reflectance Distribution Function), and temperature retrieval KMs. Part V deals with kernel-based feature extraction and provides a review of the principles of several multivariate analysis methods and their kernel extensions. This book is aimed at engineers, scientists, and researchers involved in remote sensing data processing, and also those working within machine learning and pattern recognition.

Techniques and Applications of Hyperspectral Image Analysis Techniques and Applications of Hyperspectral Image Analysis gives an introduction to the field of image analysis using hyperspectral techniques, and includes definitions and instrument descriptions. Other imaging topics that are covered are segmentation, regression and classification. The book discusses how high quality images of large data files can be structured and archived. Imaging techniques also demand accurate calibration, and are covered in sections about multivariate calibration techniques. The book explains the most important instruments for hyperspectral imaging in more technical detail. A number of applications from medical and chemical imaging are presented and there is an emphasis on data analysis including modeling, data visualization, model testing and statistical interpretation.

Hyperspectral Data Processing Image Fusion is an important branch of information fusion, and it is also an important technology for image understanding and computer vision. The fusion process is to merging different images into one to get more accurate description for the scene. The original images for image fusion are always obtained by several different image sensors, or the same sensor in different operating modes. The fused image can provide more effective information for further image processing, such as image segmentation, object detection and recognition. Image fusion is a new study field which combined with many different disciplines, such as sensors, signal processing, image processing, computer and artificial intelligence. In the past two decades, a large number of research literatures appear. This book is edited based on these research results, and many research scholars give a great help to this book.

Hyperspectral Imaging Interest in computer vision and image processing has grown in recent years with the advancement of everyday technologies such as smartphones, computer games, and social robotics. These advancements have allowed for advanced algorithms that have improved the processing capabilities of these technologies. Advancements in Computer Vision and Image Processing is a critical scholarly resource that explores the impact of new technologies on computer vision and image processing methods in everyday life. Featuring coverage on a wide range of topics including 3D visual localization, cellular automata-based structures, and eye and face recognition, this book is geared toward academicians, technology professionals, engineers, students, and researchers seeking current research on the development of sophisticated algorithms to process images and videos in real time.

Deep Learning for Hyperspectral Image Analysis and Classification Hyperspectral Satellites and System Design is the first book on this subject. It provides a systematic analysis and detailed design of the entire development process of hyperspectral satellites. Derived from the author’s 25-year firsthand experience as a technical lead of space missions at the Canadian Space Agency, the book offers engineers, scientists, and decision-makers detailed knowledge and guidelines on hyperspectral satellite system design, trade-offs, performance modeling and simulation, optimization from component to system level, subsystem design, and implementation strategies. This information will help reduce the risk, shorten the development period, and lower the cost of hyperspectral satellite missions. This book is a must-have reference for professionals in developing hyperspectral satellites and data applications. It is also an excellent introductory book for early practitioners and students who want to learn more about hyperspectral satellites and their applications.

The Future of Hyperspectral Imaging Based on the integration of computer vision and spectroscopy techniques, hyperspectral imaging is a novel technology for obtaining both spatial and spectral information on a product. Used for nearly 20 years in the aerospace and military industries, more recently hyperspectral imaging has emerged and matured into one of the most powerful and rapidly growing methods of non-destructive food quality analysis and control. Hyperspectral Imaging for Food Quality Analysis and Control provides the core information about how this proven science can be practically applied for food quality assessment, including information on the equipment available and selection of the most appropriate tools. Additionally, real-world food-industry-based examples are included, giving the reader important insights into the actual application of the science in evaluating food products. Presentation of principles and instruments provides core understanding of how this science performs, as well as guidelines on selecting the most appropriate equipment for implementation. Includes real-world, practical application to demonstrate the viability and challenges of working with this technology. Provides necessary information for making correct determination on use of hyperspectral imaging.

Remote Sensing Digital Image Analysis This book presents new methods of analyzing and processing hyperspectral medical images, which can be used in diagnostics, for example for dermatological images. The algorithms proposed are fully automatic and the results obtained are fully reproducible. Their operation was tested on a set of several thousands of hyperspectral images and they were implemented in Matlab. The presented source code can be used without licensing restrictions. This is a valuable resource for computer scientists, bioengineers, doctoral students, and dermatologists interested in contemporary analysis methods.

Remote Sensing Digital Image Analysis This book focuses on deep learning-based methods for hyperspectral image (HSI) analysis. Unsupervised spectral-spatial adaptive band-noise factor-based formulation is devised for HSI noise detection and band categorization. The method to characterize the bands along with the noise estimation of HSIs will benefit subsequent remote sensing techniques significantly. This book develops on two fronts. On the one hand, it aims at domain professionals who want to have an updated overview of how hyperspectral acquisition techniques can combine with deep learning architectures to solve specific tasks in different application fields. On the other hand, the authors want to target the machine learning and computer vision experts by giving them a picture of how deep learning technologies are applied to hyperspectral data from a multidisciplinary perspective. The presence of these two viewpoints and the inclusion of application fields of remote sensing by deep learning are the original contributions of this review, which also highlights some potentialities and critical issues related to the observed development trends.
Handbook of Blind Source Separation Microwave Remote Sensing of Land Surface Techniques and Methods brings essential coverage of the space-time aspects of observation on continental surfaces. The authors explore major applications and provide detailed chapters on physical principles, physics of measurement, and data processing for each technique, bringing readers up-to-date descriptions of techniques used by leading scientists in the field of remote sensing and Earth observation. Presents clear-and-concise descriptions of modern methods. Explores current remote-sensing techniques that include physical aspects of measurement (theory) and their applications. Provides physical principles, measurement, and data processing chapters that are included for each technique described.

Advanced Image Processing Techniques for Remotely Sensed Hyperspectral Data Edited by the people who were forerunners in creating the field, together with contributions from 34 leading international experts, this handbook provides the definitive reference on Blind Source Separation, giving a broad and comprehensive description of all of the core principles and methods, numerical algorithms, and major applications in the fields of telecommunications, biomedical engineering, and audio, acoustic and speech processing. Going beyond a machine learning perspective, the book reflects recent results in signal processing and numerical analysis, and includes topics such as optimization criteria, mathematical tools, the design of numerical algorithms, convolutive mixtures, and time-frequency approaches. This Handbook is an ideal reference for university researchers, R&D engineers and graduates wishing to learn the core principles, methods, algorithms, and applications of Blind Source Separation. Covers the principles and major techniques and methods in one book. Edited by the pioneers in the field with contributions from 34 of the world’s experts. Describes the main existing numerical algorithms and gives practical advice on their design. Covers the latest cutting-edge topics: second order methods, algebraic identification of under-determined mixtures, time-frequency methods, Bayesian approaches, blind identification under non-negativity approaches, semi-blind methods for communications. Shows the applications of the methods to key application areas such as telecommunications, biomedical engineering, speech, acoustic, audio and music processing, while also giving a general method for developing applications.

Fourier Transforms Based on the authors’ research, this book introduces the main processing techniques in hyperspectral imaging. In this context, SVM-based classification, distance comparison-based endmember extraction, SVM-based spectral unmixing, spatial attraction model-based sub-pixel mapping and MAP/POCS-based super-resolution reconstruction are discussed in depth. Readers will gain a comprehensive understanding of these cutting-edge hyperspectral imaging techniques. Researchers and graduate students in fields such as remote sensing, surveying and mapping, geosciences and information systems will benefit from this valuable resource.

Hyperspectral Imaging thoroughly discusses the latest advances in image processing and analysis. Researchers and engineers working in research, development, and operations in the food industry can use this book to conduct model-based sub-pixel mapping and MAP/POCS-based super-resolution reconstruction. Hyperspectral Imaging provides a comprehensive roadmap of hyperspectral image analysis, with applications in diverse scientific fields. This unique work provides engineers and technologists working in research, development, and operations in the food industry with critical, comprehensive and readily accessible information on the art and science of computer vision technology. Undergraduate and postgraduate students and researchers in universities and research institutions will also find this an essential reference source. Discusses novel technology for recognizing objects and extracting quantitative information from digital images in order to provide objective, rapid, non-contact and non-destructive quality evaluation. International authors with both academic and professional credentials address in detail one aspect of the relevant technology per chapter making this ideal for textbook use. Divided into three parts, it begins with an outline of the fundamentals of the technology, followed by full coverage of the application in the most researched areas of meats and other foods, fruits, vegetables and grains.

Hyperspectral Imaging Technology in Food and Agriculture Hyperspectral imaging or imaging spectroscopy is a novel technology for acquiring and analysing an image of a real scene by computers and other devices in order to obtain quantitative information for quality evaluation and process control. Image processing and analysis is the core technique in computer vision. With the continuous development in hardware and software for image processing and analysis, the application of hyperspectral imaging has been extended to the safety and quality...
evaluation of meat and produce. Especially in recent years, hyperspectral imaging has attracted much research and development attention, as a result rapid scientific and technological advances have increasingly taken place in food and agriculture, especially on safety and quality inspection, classification and evaluation of a wide range of food products, illustrating the great advantages of using the technology for objective, rapid, non-destructive and automated safety inspection as well as quality control. Therefore, as the first reference book in the area, Hyperspectral Imaging Technology in Food and Agriculture focuses on these recent advances. The book is divided into three parts, which begins with an outline of the fundamentals of the technology, followed by full covering of the application in the most researched areas of meats, fruits, vegetables, grains and other foods, which mostly covers food safety and quality as well as remote sensing applicable for crop production. Hyperspectral Imaging Technology in Food and Agriculture is written by international peers who have both academic and professional credentials, with each chapter addressing in detail one aspect of the relevant technology, thus highlighting the truly international nature of the work. Therefore the book should provide the engineer and technologist working in research, development, and operations in the food and agricultural industry with critical, comprehensive and readily accessible information on the art and science of hyperspectral imaging technology. It should also serve as an essential reference source to undergraduate and postgraduate students and researchers in universities and research institutions.

Copyright code: e93b0f64b2a7f3b992d65b2e49106bc