

# Digital Remote Sensing

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**Computer Processing of Remotely-Sensed Images** - Paul M. Mather  
2005-12-13

Remotely-sensed images of the Earth's surface provide a valuable source of information about the geographical distribution and properties of natural and cultural features. This fully revised and updated edition of a highly regarded textbook deals with the mechanics of processing remotely-sensed images. Presented in an accessible manner, the book covers a wide range of image processing and pattern recognition techniques. Features include: New topics on LiDAR data processing, SAR interferometry, the analysis of imaging spectrometer image sets and the use of the wavelet transform. An accompanying CD-ROM with: updated MIPS software, including modules for standard procedures such as image display, filtering, image transforms, graph plotting, import of data from a range of sensors. A set of exercises, including data sets, illustrating the application of discussed methods using the MIPS software. An extensive list of WWW resources including colour illustrations for easy download. For further information, including exercises and latest software information visit the Author's Website at: <http://homepage.ntlworld.com/paul.mather/ComputerProcessing3/>  
*Manual of Digital Earth* - Huadong Guo 2019-11-18

This open access book offers a summary of the development of Digital Earth over the past twenty years. By reviewing the initial vision of Digital

Earth, the evolution of that vision, the relevant key technologies, and the role of Digital Earth in helping people respond to global challenges, this publication reveals how and why Digital Earth is becoming vital for acquiring, processing, analysing and mining the rapidly growing volume of global data sets about the Earth. The main aspects of Digital Earth covered here include: Digital Earth platforms, remote sensing and navigation satellites, processing and visualizing geospatial information, geospatial information infrastructures, big data and cloud computing, transformation and zooming, artificial intelligence, Internet of Things, and social media. Moreover, the book covers in detail the multi-layered/multi-faceted roles of Digital Earth in response to sustainable development goals, climate changes, and mitigating disasters, the applications of Digital Earth (such as digital city and digital heritage), the citizen science in support of Digital Earth, the economic value of Digital Earth, and so on. This book also reviews the regional and national development of Digital Earth around the world, and discusses the role and effect of education and ethics. Lastly, it concludes with a summary of the challenges and forecasts the future trends of Digital Earth. By sharing case studies and a broad range of general and scientific insights into the science and technology of Digital Earth, this book offers an essential introduction for an ever-growing international audience.

**Remote Sensing Digital Image Analysis** - John A. Richards

2013-04-17

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.

Satellite Remote Sensing - Rosa Lasaponara 2012-01-18

This book provides a state-of-the art overview of satellite archaeology and it is an invaluable volume for archaeologists, scientists, and managers interested in using satellite Earth Observation (EO) to improve the traditional approach for archaeological investigation, protection and management of Cultural Heritage. The recent increasing development of EO techniques and the tremendous advances in Information and Communication Technologies (ICT) have resulted primarily in Cultural Heritage applications. The book focuses on new challenging prospects for the use of EO in archaeology not only for probing the subsurface to unveil sites and artifacts, but also for the management and valorization as well as for the monitoring and preservation of cultural resources. The book provides a first-class understanding of this revolutionary scenario which was unthinkable several years ago. The book offers: (i) an excellent collection of outstanding articles focusing on satellite data

processing, analysis and interpretation for archaeological applications, (ii) impressive case studies, (iii) striking examples of the high potential of the integration of multi-temporal, multi-scale, multi-sensors techniques. Each chapter is composed as an authoritative contribution to help the reader grasp the value of its content. The authors are renowned experts from the international scientific community. Audience: This book will be of interest to scientists in remote sensing applied to archeology, geoarcheology, paleo-environment, paleo-climate and cultural heritage.

**Multitemporal Remote Sensing** - Yifang Ban 2016-12-01

Written by world renowned scientists, this book provides an excellent overview of a wide array of methods and techniques for the processing and analysis of multitemporal remotely sensed images. These methods and techniques include change detection, multitemporal data fusion, coarse-resolution time series processing, and interferometric SAR multitemporal processing, among others. A broad range of multitemporal datasets are used in their methodology demonstrations and application examples, including multispectral, hyperspectral, SAR and passive microwave data. This book features a variety of application examples covering both land and aquatic environments. Land applications include urban, agriculture, habitat disturbance, vegetation dynamics, soil moisture, land surface albedo, land surface temperature, glacier and disaster recovery. Aquatic applications include monitoring water quality, water surface areas and water fluctuation in wetland areas, spatial distribution patterns and temporal fluctuation trends of global land surface water, as well as evaluation of water quality in several coastal and marine environments. This book will help scientists, practitioners, students gain a greater understanding of how multitemporal remote sensing could be effectively used to monitor our changing planet at local, regional, and global scales.

Introductory Digital Image Processing - John R. Jensen 2015-04-17

For junior/graduate-level courses in Remote Sensing in Geography, Geology, Forestry, and Biology. Introductory Digital Image Processing: A Remote Sensing Perspective focuses on digital image processing of aircraft- and satellite-derived, remotely sensed data for Earth resource

management applications. Extensively illustrated, it explains how to extract biophysical information from remote sensor data for almost all multidisciplinary land-based environmental projects. Part of the Pearson Series Geographic Information Science. Now in full color, the Fourth Edition provides up-to-date information on analytical methods used to analyze digital remote sensing data. Each chapter contains a substantive reference list that can be used by students and scientists as a starting place for their digital image processing project or research. A new appendix provides sources of imagery and other geospatial information.

[Remote Sensing Digital Image Analysis](#) - Richards-Xiuping 1999

Remote Sensing Digital Image Analysis provides the non-specialist with an introduction to quantitative evaluation of satellite and aircraft derived remotely retrieved data. Each chapter covers the pros and cons of digital remotely sensed data, without detailed mathematical treatment of computer based algorithms, but in a manner conducive to an understanding of their capabilities and limitations. Problems conclude each chapter. This fourth edition has been developed to reflect the changes that have occurred in this area over the past several years. Its focus is on those procedures that seem now to have become part of the set of tools regularly used to perform thematic mapping. As with previous revisions, the fundamental material has been preserved in its original form because of its tutorial value; its style has been revised in places and it has been supplemented if newer aspects have emerged in the time since the third edition appeared. It still meets, however, the needs of the senior student and practitioner.

**Techniques for Image Processing and Classifications in Remote Sensing** - Robert A. Schowengerdt 2012-12-02

Techniques for Image Processing and Classifications in Remote Sensing provides an introduction to the fundamentals of computer image processing and classification (commonly called "pattern recognition" in other applications). The book begins with a discussion of digital scanners and imagery, and two key mathematical concepts for image processing and classification—spatial filtering and statistical pattern recognition. This is followed by separate chapters on image processing and

classification techniques that are widely used in the remote sensing community. The emphasis throughout is on techniques that assist in the analysis of images, not particular applications of these techniques. The book also has four appendixes, featuring a bibliography; an introduction to computer binary data representation and image data formats; a discussion of interactive image processing; and a selection of exam questions from the Image Processing Laboratory course at the University of Arizona. This book is intended for use as either a primary source in an introductory image processing course or as a supplementary text in an intermediate-level remote sensing course. The academic level addressed is upper-division undergraduate or beginning graduate, and familiarity with calculus and basic vector and matrix concepts is assumed.

*Introductory Digital Image Processing* - John R. Jensen 1996

For junior/graduate-level courses in Remote Sensing in Geography, Geology, Forestry, and Biology. This text focuses exclusively on the art and science of digital image processing of satellite and aircraft-derived remotely-sensed data for resource management. Extensively illustrated, it explains how to extract biophysical information from remote sensor data for almost all multidisciplinary land-based environmental projects. Part of the Prentice Hall Series Geographic Information Science.

**Remote Sensing** - Floyd F. Sabins, Jr. 2020-04-01

Remote sensing has undergone profound changes over the past two decades as GPS, GIS, and sensor advances have significantly expanded the user community and availability of images. New tools, such as automation, cloud-based services, drones, and artificial intelligence, continue to expand and enhance the discipline. Along with comprehensive coverage and clarity, Sabins and Ellis establish a solid foundation for the insightful use of remote sensing with an emphasis on principles and a focus on sensor technology and image acquisition. The Fourth Edition presents a valuable discussion of the growing and permeating use of technologies such as drones and manned aircraft imaging, DEMs, and lidar. The authors explain the scientific and societal impacts of remote sensing, review digital image processing and GIS, provide case histories from areas around the globe, and describe

practical applications of remote sensing to the environment, renewable and nonrenewable resources, land use/land cover, natural hazards, and climate change. • Remote Sensing Digital Database includes 27 examples of satellite and airborne imagery that can be used to jumpstart labs and class projects. The database includes descriptions, georeferenced images, DEMs, maps, and metadata. Users can display, process, and interpret images with open-source and commercial image processing and GIS software. • Flexible, revealing, and instructive, the Digital Image Processing Lab Manual provides 12 step-by-step exercises on the following topics: an introduction to ENVI, Landsat multispectral processing, image processing, band ratios and principal components, georeferencing, DEMs and lidar, IHS and image sharpening, unsupervised classification, supervised classification, hyperspectral, and change detection and radar. • Introductory and instructional videos describe and guide users on ways to access and utilize the Remote Sensing Digital Database and the Digital Image Processing Lab Manual. • Answer Keys are available for instructors for questions in the text as well as the Digital Image Processing Lab Manual.

Satellite Remote Sensing of Natural Resources - David L. Verbyla  
2022-02-27

Satellite Remote Sensing of Natural Resources offers an introduction to digital remote sensing. This comprehensive text emphasizes the basics, with simple concepts presented in clear, easy-to-understand language. For those who are interested in practical remote sensing but do not have an extensive background in math and statistics, this primer is invaluable. The main topics covered include satellite images, image processing systems, spectral regions, radiometric and geometric corrections, supervised and unsupervised classification, and accuracy assessment. Each chapter concludes with a section of sample problems and list of additional readings.

**Digital Remote Sensing** - Prithvish Nag 1998

*Image Registration for Remote Sensing* - Jacqueline Le Moigne  
2011-03-24

Image registration employs digital image processing in order to bring two or more digital images into precise alignment for analysis and comparison. Accurate registration algorithms are essential for creating mosaics of satellite images and tracking changes on the planet's surface over time. Bringing together invited contributions from 36 distinguished researchers, the book presents a detailed overview of current research and practice in the application of image registration to remote sensing imagery. Chapters cover the problem definition, theoretical issues in accuracy and efficiency, fundamental algorithms, and real-world case studies of image registration software applied to imagery from operational satellite systems. This book provides a comprehensive and practical overview for Earth and space scientists, presents image processing researchers with a summary of current research, and can be used for specialised graduate courses.

**Remote Sensing Time Series** - Claudia Kuenzer 2015-04-28

This volume comprises an outstanding variety of chapters on Earth Observation based time series analyses, undertaken to reveal past and current land surface dynamics for large areas. What exactly are time series of Earth Observation data? Which sensors are available to generate real time series? How can they be processed to reveal their valuable hidden information? Which challenges are encountered on the way and which pre-processing is needed? And last but not least: which processes can be observed? How are large regions of our planet changing over time and which dynamics and trends are visible? These and many other questions are answered within this book "Remote Sensing Time Series Analyses - Revealing Land Surface Dynamics". Internationally renowned experts from Europe, the USA and China present their exciting findings based on the exploitation of satellite data archives from well-known sensors such as AVHRR, MODIS, Landsat, ENVISAT, ERS and METOP amongst others. Selected review and methods chapters provide a good overview over time series processing and the recent advances in the optical and radar domain. A fine selection of application chapters addresses multi-class land cover and land use change at national to continental scale, the derivation of patterns of

vegetation phenology, biomass assessments, investigations on snow cover duration and recent dynamics, as well as urban sprawl observed over time.

**Remote Sensing Digital Image Analysis** - John A. Richards

2014-10-15

Remote Sensing Digital Image Analysis provides the non-specialist with an introduction to quantitative evaluation of satellite and aircraft derived remotely retrieved data. Since the first edition of the book there have been significant developments in the algorithms used for the processing and analysis of remote sensing imagery; nevertheless many of the fundamentals have substantially remained the same. This new edition presents material that has retained value since those early days, along with new techniques that can be incorporated into an operational framework for the analysis of remote sensing data. The book is designed as a teaching text for the senior undergraduate and postgraduate student, and as a fundamental treatment for those engaged in research using digital image processing in remote sensing. The presentation level is for the mathematical non-specialist. Since the very great number of operational users of remote sensing come from the earth sciences communities, the text is pitched at a level commensurate with their background. Each chapter covers the pros and cons of digital remotely sensed data, without detailed mathematical treatment of computer based algorithms, but in a manner conducive to an understanding of their capabilities and limitations. Problems conclude each chapter.

**Thermal Infrared Remote Sensing** - Claudia Kuenzer 2013-06-17

This book provides a comprehensive overview of the state of the art in the field of thermal infrared remote sensing. Temperature is one of the most important physical environmental variables monitored by earth observing remote sensing systems. Temperature ranges define the boundaries of habitats on our planet. Thermal hazards endanger our resources and well-being. In this book renowned international experts have contributed chapters on currently available thermal sensors as well as innovative plans for future missions. Further chapters discuss the underlying physics and image processing techniques for analyzing

thermal data. Ground-breaking chapters on applications present a wide variety of case studies leading to a deepened understanding of land and sea surface temperature dynamics, urban heat island effects, forest fires, volcanic eruption precursors, underground coal fires, geothermal systems, soil moisture variability, and temperature-based mineral discrimination. 'Thermal Infrared Remote Sensing: Sensors, Methods, Applications' is unique because of the large field it spans, the potentials it reveals, and the detail it provides. This book is an indispensable volume for scientists, lecturers, and decision makers interested in thermal infrared technology, methods, and applications.

**Image Processing and GIS for Remote Sensing** - Jian Guo Liu 2016-01-04

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.

**Remote Sensing** - John R. Schott 2007-05-25

A thorough update to what is already one of the most comprehensive and rigorous texts in the field, the new edition incorporates the many advancements made in remote sensing over the past decade.

**Remote Sensing** - Robert A. Schowengerdt 2012-12-02

This book is a 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 suited 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.

**Remote Sensing of Coastal Aquatic Environments** - Richard L. Miller  
2007-03-22

This book provides extensive insight on remote sensing of coastal waters from aircraft and space-based platforms. The primary focus of the book is optical remote sensing using passive instruments, to measure and analyze the coastal aquatic environment. The authors have gathered information from a variety of sources, to help non-specialists grasp new techniques and technology, to quickly produce useful data

**Digital Methods and Remote Sensing in Archaeology** - Maurizio Forte  
2017-02-10

This volume debuts the new scope of Remote Sensing, which was first defined as the analysis of data collected by sensors that were not in physical contact with the objects under investigation (using cameras, scanners, and radar systems operating from spaceborne or airborne platforms). A wider characterization is now possible: Remote Sensing can be any non-destructive approach to viewing the buried and nominally invisible evidence of past activity. Spaceborne and airborne sensors, now

supplemented by laser scanning, are united using ground-based geophysical instruments and undersea remote sensing, as well as other non-invasive techniques such as surface collection or field-walking survey. Now, any method that enables observation of evidence on or beneath the surface of the earth, without impact on the surviving stratigraphy, is legitimately within the realm of Remote Sensing. The new interfaces and senses engaged in Remote Sensing appear throughout the book. On a philosophical level, this is about the landscapes and built environments that reveal history through place and time. It is about new perspectives—the views of history possible with Remote Sensing and fostered in part by immersive, interactive 3D and 4D environments discussed in this volume. These perspectives are both the result and the implementation of technological, cultural, and epistemological advances in record keeping, interpretation, and conceptualization. Methodology presented here builds on the current ease and speed in collecting data sets on the scale of the object, site, locality, and landscape. As this volume shows, many disciplines surrounding archaeology and related cultural studies are currently involved in Remote Sensing, and its relevance will only increase as the methodology expands.

Spectral Mixture for Remote Sensing - Yosio Edemir Shimabukuro  
2018-11-10

This book explains in a didactic way the basic concepts of spectral mixing, digital numbers and orbital sensors, and then presents the linear modelling technique of spectral mixing and the generation of fractional images. In addition to presenting a theoretical basis for spectral mixing, the book provides examples of practical applications such as projects for estimating and monitoring deforested areas in the Amazon. In its seven chapters, the book offers remote sensing techniques to understand the main concepts, methods, and limitations of spectral mixing for digital image processing. Chapter 1 addresses the basic concepts of spectral mixing, while chapters 2 and 3 discuss digital numbers and orbital sensors such as MODIS and Landsat MSS. Chapter 4 details the linear spectral mixing model, and chapter 5 talks about how to use this

technique to create fraction images. Chapter 6 offers remote sensing applications of fraction images in deforestation monitoring, burned-area mapping, selective logging detection, and land-use/land-cover mapping. Chapter 7 gives some concluding thoughts on spectral mixing, and considers future uses in environmental remote sensing. This book will be of interest to students, teachers, and researchers using remote sensing for Earth observation and environmental modelling.

**Big Data for Remote Sensing: Visualization, Analysis and Interpretation** - Nilanjan Dey 2018-05-23

This book thoroughly covers the remote sensing visualization and analysis techniques based on computational imaging and vision in Earth science. Remote sensing is considered a significant information source for monitoring and mapping natural and man-made land through the development of sensor resolutions that committed different Earth observation platforms. The book includes related topics for the different systems, models, and approaches used in the visualization of remote sensing images. It offers flexible and sophisticated solutions for removing uncertainty from the satellite data. It introduces real time big data analytics to derive intelligence systems in enterprise earth science applications. Furthermore, the book integrates statistical concepts with computer-based geographic information systems (GIS). It focuses on image processing techniques for observing data together with uncertainty information raised by spectral, spatial, and positional accuracy of GPS data. The book addresses several advanced improvement models to guide the engineers in developing different remote sensing visualization and analysis schemes. Highlights on the advanced improvement models of the supervised/unsupervised classification algorithms, support vector machines, artificial neural networks, fuzzy logic, decision-making algorithms, and Time Series Model and Forecasting are addressed. This book guides engineers, designers, and researchers to exploit the intrinsic design remote sensing systems. The book gathers remarkable material from an international experts' panel to guide the readers during the development of earth big data analytics and their challenges.

**Land Remote Sensing and Global Environmental Change** - Bhaskar Ramachandran 2010-12-14

Land Remote Sensing and Global Environmental Change: The Science of ASTER and MODIS is an edited compendium of contributions dealing with ASTER and MODIS satellite sensors aboard NASA's Terra and Aqua platforms launched as part of the Earth Observing System fleet in 1999 and 2002 respectively. This volume is divided into six sections. The first three sections provide insights into the history, philosophy, and evolution of the EOS, ASTER and MODIS instrument designs and calibration mechanisms, and the data systems components used to manage and provide the science data and derived products. The latter three sections exclusively deal with ASTER and MODIS data products and their applications, and the future of these two classes of remotely sensed observations.

**Remote Sensing Digital Image Analysis** - John A. Richards 2021

Remote Sensing Digital Image Analysis provides a comprehensive treatment of the methods used for the processing and interpretation of remotely sensed image data. Over the past decade there have been continuing and significant developments in the algorithms used for the analysis of remote sensing imagery, even though many of the fundamentals have substantially remained the same. As with its predecessors this new edition again presents material that has retained value but also includes newer techniques, covered from the perspective of operational remote sensing. The book is designed as a teaching text for the senior undergraduate and postgraduate student, and as a fundamental treatment for those engaged in research using digital image analysis in remote sensing. The presentation level is for the mathematical non-specialist. Since the very great number of operational users of remote sensing come from the earth sciences communities, the text is pitched at a level commensurate with their background. The chapters progress logically through means for the acquisition of remote sensing images, techniques by which they can be corrected, and methods for their interpretation. The prime focus is on applications of the methods, so that worked examples are included and a set of problems

conclude each chapter.

**Essential Image Processing and GIS for Remote Sensing** - Jian Guo Liu 2013-04-10

Essential Image Processing and GIS for Remote Sensing is an accessible overview of the subject and successfully draws together these three key areas in a balanced and comprehensive manner. The book provides an overview of essential techniques and a selection of key case studies in a variety of application areas. Key concepts and ideas are introduced in a clear and logical manner and described through the provision of numerous relevant conceptual illustrations. Mathematical detail is kept to a minimum and only referred to where necessary for ease of understanding. Such concepts are explained through common sense terms rather than in rigorous mathematical detail when explaining image processing and GIS techniques, to enable students to grasp the essentials of a notoriously challenging subject area. The book is clearly divided into three parts, with the first part introducing essential image processing techniques for remote sensing. The second part looks at GIS and begins with an overview of the concepts, structures and mechanisms by which GIS operates. Finally the third part introduces Remote Sensing Applications. Throughout the book the relationships between GIS, Image Processing and Remote Sensing are clearly identified to ensure that students are able to apply the various techniques that have been covered appropriately. The latter chapters use numerous relevant case studies to illustrate various remote sensing, image processing and GIS applications in practice.

*Remote Sensing Image Classification in R* - Courage Kamusoko 2019-07-24

This book offers an introduction to remotely sensed image processing and classification in R using machine learning algorithms. It also provides a concise and practical reference tutorial, which equips readers to immediately start using the software platform and R packages for image processing and classification. This book is divided into five chapters. Chapter 1 introduces remote sensing digital image processing in R, while chapter 2 covers pre-processing. Chapter 3 focuses on image

transformation, and chapter 4 addresses image classification. Lastly, chapter 5 deals with improving image classification. R is advantageous in that it is open source software, available free of charge and includes several useful features that are not available in commercial software packages. This book benefits all undergraduate and graduate students, researchers, university teachers and other remote- sensing practitioners interested in the practical implementation of remote sensing in R.

*Remote Sensing Digital Image Analysis: An Introduction, 2E* - Richards John A. Et.Al 2007-12-01

**Remote Sensing Image Fusion** - Christine Pohl 2016-10-03

Remote Sensing Image Fusion: A Practical Guide gives an introduction to remote sensing image fusion providing an overview on the sensors and applications. It describes data selection, application requirements and the choice of a suitable image fusion technique. It comprises a diverse selection of successful image fusion cases that are relevant to other users and other areas of interest around the world. The book helps newcomers to obtain a quick start into the practical value and benefits of multi-sensor image fusion. Experts will find this book useful to obtain an overview on the state of the art and understand current constraints that need to be solved in future research efforts. For industry professionals the book can be a great introduction and basis to understand multisensor remote sensing image exploitation and the development of commercialized image fusion software from a practical perspective. The book concludes with a chapter on current trends and future developments in remote sensing image fusion. Along with the book, RSIF website provides additional up-to-date information in the field.

*Remote Sensing Image Analysis: Including the Spatial Domain* - Steven M. de Jong 2007-07-26

Remote Sensing image analysis is mostly done using only spectral information on a pixel by pixel basis. Information captured in neighbouring cells, or information about patterns surrounding the pixel of interest often provides useful supplementary information. This book presents a wide range of innovative and advanced image processing

methods for including spatial information, captured by neighbouring 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 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, engineering and urban and regional planning.

*Radar Remote Sensing of Urban Areas* - Uwe Soergel 2010-03-10

One of the key milestones of radar remote sensing for civil applications was the launch of the European Remote Sensing Satellite 1 (ERS 1) in 1991. The platform carried a variety of sensors; the Synthetic Aperture Radar (SAR) is widely considered to be the most important. This active sensing technique provides all-day and all-weather mapping capability of considerably finer spatial resolution. ERS 1 and its sister system ERS 2 (launch 1995) were primarily designed for ocean applications, but soon the focus of attention turned to onshore mapping. Examples for typical applications are land cover classification also in tropical zones and monitoring of glaciers or urban growth. In parallel, international Space Shuttle Missions dedicated to radar remote sensing were conducted starting already in the 1980s. The most prominent were the SIR-C/X-SAR mission focussing on the investigation of multi-frequency and multi-polarization SAR data and the famous Shuttle Radar Topography Mission (SRTM). Data acquired during the latter enabled to derive a DEM of almost global coverage by means of SAR Interferometry. It is indispensable today and for many regions the best elevation model available. Differential SAR Interferometry based on time series of imagery of the

ERS satellites and their successor Envisat became an important and unique technique for surface deformation monitoring. The spatial resolution of those devices is in the order of some tens of meters.

Remote Sensing of Urban and Suburban Areas - Tarek Rashed  
2010-06-03

"Remote Sensing of Urban and Suburban Areas" provides instructors with a text reference that has a logical and easy-to-follow flow of topics around which they can structure the syllabi of their urban remote sensing courses. Topics have been chosen to bridge the gap between remote sensing and urban studies through a better understanding of the science that underlies both fields. In so doing, the book includes 17 chapters written by leading international experts in respected fields to provide a balanced coverage of fundamental issues in both remote sensing and urban studies. Emphasis is placed on: theoretical and practical issues in contemporary urban studies and remote sensing; the spectral, spatial and temporal requirements of remotely sensed data in relation to various urban phenomena; methods and techniques for analyzing and integrating remotely sensed data and image processing with geographic information systems to address urban problems; and examples of applications in which applying remote sensing to tackle urban problems is deemed useful and important.

**Remote Sensing Time Series Image Processing** - Qihao Weng  
2018-04-17

Today, remote sensing technology is an essential tool for understanding the Earth and managing human-Earth interactions. There is a rapidly growing need for remote sensing and Earth observation technology that enables monitoring of world's natural resources and environments, managing exposure to natural and man-made risks and more frequently occurring disasters, and helping the sustainability and productivity of natural and human ecosystems. The improvement in temporal resolution/revisit allows for the large accumulation of images for a specific location, creating a possibility for time series image analysis and eventual real-time assessments of scene dynamics. As an authoritative text, Remote Sensing Time Series Image Processing brings together

active and recognized authors in the field of time series image analysis and presents to the readers the current state of knowledge and its future directions. Divided into three parts, the first addresses methods and techniques for generating time series image datasets. In particular, it provides guidance on the selection of cloud and cloud shadow detection algorithms for various applications. Part II examines feature development and information extraction methods for time series imagery. It presents some key remote sensing-based metrics, and their major applications in ecosystems and climate change studies. Part III illustrates various applications of time series image processing in land cover change, disturbance attribution, vegetation dynamics, and urbanization. This book is intended for researchers, practitioners, and students in both remote sensing and imaging science. It can be used as a textbook by undergraduate and graduate students majoring in remote sensing, imaging science, civil and electrical engineering, geography, geosciences, planning, environmental science, land use, energy, and GIS, and as a reference book by practitioners and professionals in the government, commercial, and industrial sectors.

*Introductory Digital Image Processing* - John R. Jensen 2005

For junior/graduate-level courses in Remote Sensing in Geography, Geology, Forestry, and Biology. This revision of *Introductory Digital Image Processing: A Remote Sensing Perspective* continues to focus on digital image processing of aircraft- and satellite-derived, remotely sensed data for Earth resource management applications. Extensively illustrated, it explains how to extract biophysical information from remote sensor data for almost all multidisciplinary land-based environmental projects. Part of the Prentice Hall Series Geographic Information Science.

*GNSS Remote Sensing* - Shuanggen Jin 2013-10-01

The versatile and available GNSS signals can detect the Earth's surface environments as a new, highly precise, continuous, all-weather and near-real-time remote sensing tool. This book presents the theory and methods of GNSS remote sensing as well as its applications in the atmosphere, oceans, land and hydrology. Ground-based atmospheric

sensing, space-borne atmospheric sensing, reflectometry, ocean remote sensing, hydrology sensing as well as cryosphere sensing with the GNSS will be discussed per chapter in the book.

*Artificial Intelligence Techniques for Satellite Image Analysis* - D. Jude Hemanth 2019-11-13

The main objective of this book is to provide a common platform for diverse concepts in satellite image processing. In particular it presents the state-of-the-art in Artificial Intelligence (AI) methodologies and shares findings that can be translated into real-time applications to benefit humankind. Interdisciplinary in its scope, the book will be of interest to both newcomers and experienced scientists working in the fields of satellite image processing, geo-engineering, remote sensing and Artificial Intelligence. It can be also used as a supplementary textbook for graduate students in various engineering branches related to image processing.

*Satellite Radar Interferometry* - V. B. H. (Gini) Ketelaar 2009-04-07

This book investigates the applicability of satellite radar interferometry (InSAR) for deformation monitoring. The presented methodologies are demonstrated in an integrated way for the entire northern part of the Netherlands and a part of Germany.

**Remote Sensing and Image Interpretation** - Thomas M. Lillesand 1979

This straightforward introduction to remote sensing provides comprehensive, up-to-date coverage of the subject for students, irrespective of their disciplines of study or the academic department in which remote sensing is taught. All the classical elements of aerial photographic interpretation and photogrammetry are described, but equal emphasis is placed on non-photographic sensing systems and the analysis of data from these systems using digital image processing procedures. Includes coverage of image restoration, enhancement, classification, and data merging, and new sensor systems such as the Large Format Camera, solid-state linear arrays, the Shuttle Imaging radar systems, the Landsat Thematic Mapper, the SPOT satellite system, and the NOAA Advanced Very High Resolution Radiometer. Also covers

imaging spectrometry and lidar systems. Contains extensive illustrations.  
**Digital Image Processing for Remote Sensing** - Ralph Bernstein  
1978

**The SAGE Handbook of Remote Sensing** - Timothy A Warner  
2009-06-18

'A magnificent achievement. A who's who of contemporary remote sensing have produced an engaging, wide-ranging and scholarly review of the field in just one volume' - Professor Paul Curran, Vice-Chancellor, Bournemouth University Remote Sensing acquires and interprets small or large-scale data about the Earth from a distance. Using a wide range of spatial, spectral, temporal, and radiometric scales Remote Sensing is a large and diverse field for which this Handbook will be the key research reference. Organized in four key sections: • Interactions of Electromagnetic Radiation with the Terrestrial Environment: chapters on Visible, Near-IR and Shortwave IR; Middle IR (3-5 micrometers); Thermal IR ; Microwave • Digital sensors and Image Characteristics: chapters on

Sensor Technology; Coarse Spatial Resolution Optical Sensors ; Medium Spatial Resolution Optical Sensors; Fine Spatial Resolution Optical Sensors; Video Imaging and Multispectral Digital Photography; Hyperspectral Sensors; Radar and Passive Microwave Sensors; Lidar • Remote Sensing Analysis - Design and Implementation: chapters on Image Pre-Processing; Ground Data Collection; Integration with GIS; Quantitative Models in Remote Sensing; Validation and accuracy assessment; • Remote Sensing Analysis - Applications: LITHOSPHERIC SCIENCES: chapters on Topography; Geology; Soils; PLANT SCIENCES: Vegetation; Agriculture; HYDROSPHERIC and CRYOSPHERIC SCIENCES: Hydrosphere: Fresh and Ocean Water; Cryosphere; GLOBAL CHANGE AND HUMAN ENVIRONMENTS: Earth Systems; Human Environments & Links to the Social Sciences; Real Time Monitoring Systems and Disaster Management; Land Cover Change Illustrated throughout, an essential resource for the analysis of remotely sensed data, the SAGE Handbook of Remote Sensing provides researchers with a definitive statement of the core concepts and methodologies in the discipline.