[eBooks] Airborne And Terrestrial Laser Scanning

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**Airborne and Terrestrial Laser Scanning**-George Vosselman 2010 Written by a team of international experts, this book provides a comprehensive overview of the major applications of airborne and terrestrial laser scanning. It focuses on principles and methods and presents an integrated treatment of airborne and terrestrial laser scanning technology. After consideration of the technology and processing methods, the book turns to applications, such as engineering, forestry, cultural heritage, extraction of 3D building models, and mobile mapping. This book brings
together the various facets of the subject in a coherent text that will be relevant for advanced students, academics and practitioners.

**Airborne and Terrestrial Laser Scanning**-George Vosselman 2010

3D surface representation has long been a source of information describing surface character and facilitating an understanding of system dynamics from micro-scale (e.g. sand transport) to macro-scale (e.g. drainage channel network evolution). Data collection has been achieved through field mapping techniques and the use of remotely sensed data. Advances in this latter field have been considerable in recent years with new rapid-acquisition methods being developed centered around laser based technology. The advent of airborne and field based laser scanning instruments has allowed researchers to collect high density accurate data sets and these are revealing a wealth of new information and generating important new ideas concerning terrain characterisation and landform dynamics. The proposed book collates a series of invited peer reviewed papers presented at the a conference on geoinformatics and LIDAR to be held at the National Centre for Geocomputation based in the National University of Ireland, Maynooth. Current constraints in field survey and DEM construction are reviewed together with technical and applied issues around the new technology. The utility of the data in process modelling is also covered. The book will be of great value to researchers in the field of geomorphology, geostatistics, remote sensing and GIS and will prove extremely useful to students and practitioners concerned with terrain analysis. The proposed work will: Highlight major technological breakthrough in 3D data collection. Feature examples of application across a wide range of environmental areas.
Critically evaluate the role of laser based techniques in the environment. Detail theory and application of laser techniques in the natural environment.

**Forestry Applications of Airborne Laser Scanning**

Matti Maltamo 2014-04-08

Airborne laser scanning (ALS) has emerged as one of the most promising remote sensing technologies to provide data for research and operational applications in a wide range of disciplines related to management of forest ecosystems. This book provides a comprehensive, state-of-the-art review of the research and application of ALS in a broad range of forest-related disciplines, especially forest inventory and forest ecology. However, this book is more than just a collection of individual contributions - it consists of a well-composed blend of chapters dealing with fundamental methodological issues and contributions reviewing and illustrating the use of ALS within various domains of application. The reviews provide a comprehensive and unique overview of recent research and applications that researchers, students and practitioners in forest remote sensing and forest ecosystem assessment should consider as a useful reference text.

**Detection of Changes in Dynamic Geomorphological Environments Using Airborne and Terrestrial Laser Scanning Datasets**

Reuma Arav 2013

**Topographic Laser Ranging and Scanning**

Jie Shan 2017-12-19

A systematic, in-depth introduction to theories and principles of Light Detection and Ranging (LiDAR) technology is long overdue, as it is the most important geospatial data acquisition technology to be introduced in recent years. An advanced discussion, this text fills the void. Professionals in fields ranging from geology, geography and geoinformatics to physics, transportation, and law enforcement will benefit from this comprehensive discussion of topographic
LiDAR principles, systems, data acquisition, and data processing techniques. The book covers ranging and scanning fundamentals, and broad, contemporary analysis of airborne LiDAR systems, as well as those situated on land and in space. The authors present data collection at the signal level in terms of waveforms and their properties; at the system level with regard to calibration and georeferencing; and at the data level to discuss error budget, quality control, and data organization. They devote the bulk of the book to LiDAR data processing and information extraction and elaborate on recent developments in building extraction and reconstruction, highlighting quality and performance evaluations. There is also extensive discussion of the state-of-the-art technological developments used in: filtering algorithms for digital terrain model generation; strip adjustment of data for registration; co-registration of LiDAR data with imagery; forestry inventory; and surveying. Readers get insight into why LiDAR is the effective tool of choice to collect massive volumes of explicit 3-D data with unprecedented accuracy and simplicity. Compiled by leading experts talking about much of their own pioneering work, this book will give researchers, professionals, and senior students novel ideas to supplement their own experience and practices.

**Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book**

Zhilin Li 2008-07-01 Published on the occasion of the XXIst Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS) in Beijing, China in 2008, Advances in Photogrammetry, Remote Sensing and Spatial Information Sciences: 2008 ISPRS Congress Book is a compilation of 34 contributions from 62 researchers active within the ISPRS. The book covers

**Geo-information**

Mathias Lemmens 2011-08-03
Geomatics, the handling and processing of information and data about the Earth, is one geoscience discipline that has seen major changes in the last decade, as mapping and observation systems become ever more sensitive and sophisticated. This book is a unique and in-depth survey of the field, which has a central role to play in tackling a host of environmental issues faced by society. Covering all three strands of geomatics - applications, information technology and surveying - the chapters cover the history and background of the subject, the technology employed both to collect and disseminate data, and the varied applications to which geomatics can be put, including urban planning, assessment of biodiversity, disaster management and land administration. Relevant professionals, as well as students in a variety of disciplines such as geography and surveying, will find this book required reading. This rapidly developing field uses increasingly complex and accurate systems. Today, technology enables us to capture geo-data in full 3D as well as to disseminate it via the Web at the speed of light. We are able to continuously image the world from space at resolutions of up to 50 cm. Airborne LiDAR (laser surveying) sensors can be combined with digital camera technology to produce geometrically correct images of the Earth's surface, while integrating these with large-scale topographic maps and terrestrial as well as aerial images to produce 3D cityscapes that computer users can explore from their desktops.

**Landslide Hazard in a Changing Environment**

Davide Tiranti 2019-04-03

Landslides are one of the most dangerous geomorphological processes, responsible for losses of human lives and damages to structures, infrastructures, cultural and natural heritage. During the Anthropocene, impacts of human activity on the environment, including recent climate changes, have caused deep alterations to the natural evolution of surficial geologic processes, causing a progressive increase in the
occurrence of landslides. The goal of this Research Topic is to provide an updated overview of the progress in the field of landslide research, covering all the aspects related to the geological event: geomorphological characterization and understanding of triggering and predisposing factors, new technologies applied to the study of evolution of slope phenomena, new methodologies to foresee and mitigate landslide hazards.

**Measurement of Shrub Canopy Structures Using Terrestrial Laser Scanning and Implications for Airborne LiDAR Application** - Yanyin Xu 2010

**Interpreting Archaeological Topography** - Rachel S. Opitz 2013

Airborne Laser Scanning (ALS), or lidar, is an enormously important innovation for data collection and interpretation in archaeology. The application of archaeological 3D data deriving from sources including ALS, close-range photogrammetry and terrestrial and photogrammetric scanners has grown exponentially over the last decade. Such data present numerous possibilities and challenges, from ensuring that applications remain archaeologically relevant, to developing practices that integrate the manipulation and interrogation of complex digital datasets with the skills of archaeological observation and interpretation. This volume addresses the implications of multi-scaled topographic data for contemporary archaeological practice in a rapidly developing field, drawing on examples of ongoing projects and reflections on best practice. Twenty papers from across Europe explore the implications of these digital 3D datasets for the recording and interpretation of archaeological topography, whether at the landscape, site or artefact scale. The papers illustrate the variety of ways in which we engage with archaeological topography through 3D data, from discussions of its role in landscape archaeology, to
issues of context and integration, and to the methodological challenges of processing, visualisation and manipulation. Critical reflection on developing practice and implications for cultural resource management and research contextualize the case studies and applications, illustrating the diverse and evolving roles played by multi-scalar topographic data in contemporary archaeology.

**Forest Inventory**-Annika Kangas 2006-02-19 This book has been developed as a forest inventory textbook for students and could also serve as a handbook for practical foresters. We have set out to keep the mathematics in the book at a fairly non-technical level, and therefore, although we deal with many issues that include highly sophisticated methodology, we try to present first and foremost the ideas behind them. For foresters who need more details, references are given to more advanced scientific papers and books in the fields of statistics and biometrics. Forest inventory books deal mostly with sampling and measurement issues, as found here in section I, but since forest inventories in many countries involve much more than this, we have also included material on forestry applications. Most applications nowadays involve remote sensing technology of some sort, so that section II deals mostly with the use of remote sensing material for this purpose. Section III deals with national inventories carried out in different parts of world, and section IV is an attempt to outline some future possibilities of forest inventory methodologies. The editors, Annika Kangas Professor of Forest Mensuration and Management, Department of Forest Resource Management, University of Helsinki. Matti Maltamo Professor of Forest Mensuration, Faculty of Forestry, University of Joensuu.

ACKNOWLEDGEMENTS

**3D Laser Scanning for Heritage**-Clive Boardman 2018 The first edition of 3D Laser Scanning for Heritage
was published in 2007 and originated from the Heritage3D project that in 2006 considered the development of professional guidance for laser scanning in archaeology and architecture. Publication of the second edition in 2011 continued the aims of the original document in providing updated guidance on the use of three-dimensional (3D) laser scanning across the heritage sector. By reflecting on the technological advances made since 2011, such as the speed, resolution, mobility and portability of modern laser scanning systems and their integration with other sensor solutions, the guidance presented in this third edition should assist archaeologists, conservators and other cultural heritage professionals unfamiliar with the approach in making the best possible use of this now highly developed technique.

**UAV Photogrammetry and Remote Sensing** - Fernando Carvajal-Ramírez 2021-09-06
The concept of remote sensing as a way of capturing information from an object without making contact with it has, until recently, been exclusively focused on the use of Earth observation satellites. The emergence of unmanned aerial vehicles (UAV) with Global Navigation Satellite System (GNSS) controlled navigation and sensor-carrying capabilities has increased the number of publications related to new remote sensing from much closer distances. Previous knowledge about the behavior of the Earth's surface under the incidence different wavelengths of energy has been successfully applied to a large amount of data recorded from UAVs, thereby increasing the special and temporal resolution of the products obtained. More specifically, the ability of UAVs to be positioned in the air at pre-programmed coordinate points; to track flight paths; and in any case, to record the coordinates of the sensor position at the time of the shot and at the pitch, yaw, and roll angles have opened an interesting field of applications for low-altitude aerial photogrammetry, known as UAV photogrammetry. In addition,
Photogrammetric data processing has been improved thanks to the combination of new algorithms, e.g., structure from motion (SfM), which solves the collinearity equations without the need for any control point, producing a cloud of points referenced to an arbitrary coordinate system and a full camera calibration, and the multi-view stereopsis (MVS) algorithm, which applies an expanding procedure of sparse set of matched keypoints in order to obtain a dense point cloud. The set of technical advances described above allows for geometric modeling of terrain surfaces with high accuracy, minimizing the need for topographic campaigns for georeferencing of such products. This Special Issue aims to compile some applications realized thanks to the synergies established between new remote sensing from close distances and UAV photogrammetry.

**Advances in 3D Geoinformation Systems**
Peter van Oosterom
2008-11-19 The book covers the international state-of-the-art research in the field of 3D geo-information modeling. It focuses on comparing several types of 3D models. Due to the rapid developments in sensor techniques more and more 3D data becomes available. Effective algorithms for (semi) automatic object reconstruction are required. 3D analysis and 3D simulation techniques explore and extend the possibilities in spatial applications.

**Engineering Surveys for Industry**
Alojz Kopáčik
2020-07-22 This book is the translated English version of a text on industrial surveys, originally published in Slovak by SPEKTRUM STU Publishing. This updated version is not only a translation of the original, but also a reviewed, extended version, which reflects up-to-date international standards and regulations. The book covers topics in engineering surveying not available in other publications in this complex form, and addresses the design methodology, data processing and implementation of geodetic...
measurements under specific conditions to make industrial work environments safer and more efficient. The book begins by introducing readers to these conditions, and then discusses design of maps, geodetic networks and information systems of industrial plants, the usage of cartesian and polar coordinate measuring systems, terrestrial laser scanning technology, as well as measurement of cranes, rotary kilns and special objects of nuclear power plants. The book will be of use to teachers, students, practitioners (e.g. surveyors), quality production managers, equipment designers and mechanical engineers.

**Laser Scanning** Belén Riveiro 2019-10-18 This book provides an overview on the evolution of laser scanning technology and its noticeable impact in the structural engineering domain. It provides an up-to-date synthesis of the state-of-the-art of the technology for the reverse engineering of built constructions, including terrestrial, mobile, and different portable solutions, for laser scanning. Data processing of large point clouds has experienced an important advance in the last years, and thus, an intense activity in the development of automated data processing algorithms has been noticed. Thus, this book aims to provide an overview of state-of-the-art algorithms, different best practices and most recent processing tools in connection to particular applications. Readers will find this a comprehensive book, that updates the practice of laser scanning for researchers and professionals not only from the geomatic domain, but also other fields such as structural and construction engineering. A set of successful applications to structural engineering are illustrated, including also synergies with other technologies, that can inspire professionals to adopt laser scanning in their day-to-day activity. This cutting-edge edited volume will be a valuable resource for students, researchers and professional engineers with an interest in laser scanning and its applications in the
The Rise of Big Spatial Data

Igor Ivan 2016-10-14

This edited volume gathers the proceedings of the Symposium GIS Ostrava 2016, the Rise of Big Spatial Data, held at the Technical University of Ostrava, Czech Republic, March 16–18, 2016. Combining theoretical papers and applications by authors from around the globe, it summarises the latest research findings in the area of big spatial data and key problems related to its utilisation. Welcome to dawn of the big data era: though it’s in sight, it isn’t quite here yet. Big spatial data is characterised by three main features: volume beyond the limit of usual geo-processing, velocity higher than that available using conventional processes, and variety, combining more diverse geodata sources than usual. The popular term denotes a situation in which one or more of these key properties reaches a point at which traditional methods for geodata collection, storage, processing, control, analysis, modelling, validation and visualisation fail to provide effective solutions. >Entering the era of big spatial data calls for finding solutions that address all “small data” issues that soon create “big data” troubles. Resilience for big spatial data means solving the heterogeneity of spatial data sources (in topics, purpose, completeness, guarantee, licensing, coverage etc.), large volumes (from gigabytes to terabytes and more), undue complexity of geo-applications and systems (i.e. combination of standalone applications with web services, mobile platforms and sensor networks), neglected automation of geodata preparation (i.e. harmonisation, fusion), insufficient control of geodata collection and distribution processes (i.e. scarcity and poor quality of metadata and metadata systems), limited analytical tool capacity (i.e. domination of traditional causal-driven analysis), low visual system performance, inefficient knowledge-discovery techniques (for transformation of vast amounts of information into
tiny and essential outputs) and much more. These trends are accelerating as sensors become more ubiquitous around the world.

**Biomass and Stem Volume Equations for Tree Species in Europe** - Dimitris Zianis
2005 A review of stem volume and biomass equations for tree species growing in Europe is presented. The mathematical forms of the empirical models, the associated statistical parameters and information about the size of the trees and the country of origin were collated from scientific articles and from technical reports. The collected information provides a basic tool for estimation of carbon stocks and nutrient balance of forest ecosystems across Europe as well as for validation of theoretical models of biomass allocation.

**Handbook on Advances in Remote Sensing and Geographic Information Systems** - Margarita N. Favorskaya
2017-02-24 This book presents the latest advances in remote-sensing and geographic information systems and applications. It is divided into four parts, focusing on Airborne Light Detection and Ranging (LiDAR) and Optical Measurements of Forests; Individual Tree Modelling; Landscape Scene Modelling; and Forest Eco-system Modelling. Given the scope of its coverage, the book offers a valuable resource for students, researchers, practitioners, and educators interested in remote sensing and geographic information systems and applications.

**A Voxel-based Method for Individual Tree Detection Using Airborne Lidar in Eastern U.S. Hardwood Forests** - Jeff Hershey
2021 For more than a century, forest inventories have been used to support forest management and timber valuation activities. Today's inventories still rely primarily on manual measurements combined with sampling and modeling techniques. In recent years, new
opportunities in carbon sequestration and an increasingly sophisticated timber market have prompted a need for more scalable and efficient inventory methods. To meet this demand, the industry has turned to remote sensing--predominantly light detection and ranging (LiDAR), which utilizes lasers to scan and measure features in 3D space. While much progress has been made, data resolution and cost challenges for both airborne and terrestrial LiDAR still exist. Airborne Laser Scanning (ALS) is more efficient for measuring large forest areas but faces challenges with respect to resolution and occlusion, leading to omission of understory trees. Terrestrial Laser Scanning (TLS) performs better in those respects but relies on expensive and typically unwieldy hardware. Area-based LiDAR approaches have been successful for large-scale applications but are not ideal for smaller parcels. As such, a need persists for a LiDAR-based solution that enables efficient generation of large-area forest inventory data yet is scalable to smaller forest plots and a range of forest types. The objective of this study was the development of a scalable individual tree detection method that leveraged airborne LiDAR data and performed well in mixed-species hardwood forests found in the northeastern United States. Existing research in individual tree detection has focused on methods that work well in conifer-dominated forests and homogenous settings such as plantations. These approaches, many of them based on top-down canopy height models, perform less favorably in deciduous stands due to the canopy complexity and crown characteristics inherent to these forest types. The voxel-based method proposed here uses detailed ground-measured tree survey data and leaf-off LiDAR collected in 2019-2020 over the Shavers Creek Watershed in Pennsylvania, United States. The method detected 68% of all reference trees greater than 10cm diameter at breast height (DBH) and 87% of sawtimber-sized trees greater than 28cm DBH, and it performed consistently
across 48 subplots in the three-hectare test area. A new tree matching method leveraging linear integer programming was used for training and evaluation of the method. This tool enabled true one-to-one matching of predicted and reference trees and the validation of tree detections. Mean positional accuracy for predicted trees was within one meter of ground-measured reference trees. The results indicate the method has potential to be operationalized for both traditional forest management activities and in meeting the demand for more frequent and scalable inventories spurred by a growing forest carbon sequestration industry.

**Advanced Procrustes Analysis Models in Photogrammetric Computer Vision**-Fabio Crosilla 2019-02-28 This book gives a comprehensive view of the developed procrustes models, including the isotropic, the generalized and the anisotropic variants. These represent original tools to perform, among others, the bundle block adjustment and the global registration of multiple 3D LiDAR point clouds. Moreover, the book also reports the recently derived total least squares solution of the anisotropic Procrustes model, together with its practical application in solving the exterior orientation of one image. The book is aimed at all those interested in discovering valuable innovative algorithms for solving various photogrammetric computer vision problems. In this context, where functional models are non-linear, Procrustean methods prove to be powerful since they do not require any linearization nor approximated values of the unknown parameters, furnishing at the same time results comparable in terms of accuracy with those given by the state-of-the-art methods.

**Proceedings of the 18th International Conference on Computing in Civil and Building Engineering**-Eduardo Toledo Santos 2020-07-14 This book gathers
the latest advances, innovations, and applications in the field of information technology in civil and building engineering, presented at the 18th International Conference on Computing in Civil and Building Engineering (ICCCBE), São Paulo, Brazil, August 18-20, 2020. It covers highly diverse topics such as BIM, construction information modeling, knowledge management, GIS, GPS, laser scanning, sensors, monitoring, VR/AR, computer-aided construction, product and process modeling, big data and IoT, cooperative design, mobile computing, simulation, structural health monitoring, computer-aided structural control and analysis, ICT in geotechnical engineering, computational mechanics, asset management, maintenance, urban planning, facility management, and smart cities. Written by leading researchers and engineers, and selected by means of a rigorous international peer-review process, the contributions highlight numerous exciting ideas that will spur novel research directions and foster multidisciplinary collaborations.

**Object and Pattern Recognition in Remote Sensing**-Professor Stefan Hinz 2017-08-31 Fully automated interpretation and understanding of remotely sensed data by a computer has been a challenge for many decades, and many approaches have been developed over the years. Significant advances in knowledge-based image understanding, machine learning and artificial intelligence has led to this topic being the focus of much research in recent years. This book highlights the different theoretical and application-oriented aspects and potential solutions to the topic of automated remote sensing data analysis. Thereby, both classical knowledge-based as well as modern machine learning-oriented concepts are described. A field such as this is specialized and dynamic and also interdisciplinary and multilayered. Written by an
international team of experts, the book has therefore been split into parts dealing with the concepts and applications, and the focus is on elucidating the complementarity of different lines of research rather than providing the complete set of scientific approaches. Part A of this book gives insight into the basic theories and concepts of feature extraction, image understanding and the respective assessment strategies as well as into geometric, radiometric and sensor-related fundamentals of remote sensing technology. Part B focuses on various scientific and practical applications of remote sensing data analysis. These range from the automatic detailed reconstruction of complex 3D environments to visual tracking of objects in image sequences as well as monitoring natural and anthropogenic long-term processes on a regional scale. Part C sketches recent trends in automatic analysis of remote sensing data.

**Advances in Airborne Lidar Systems and Data**

**Processing**- 2018-05-11 This book collects the papers in the special issue "Airborne Laser Scanning" in Remote Sensing (Nov. 2016) and several other selected papers published in the same journal in the past few years. Our intention is to reflect recent technological developments and innovative techniques in this field. The book consists of 23 papers in six subject areas: 1) Single photon and Geiger-mode Lidar, 2) Multispectral lidar, 3) Waveform lidar, 4) Registration of point clouds, 5) Trees and terrain, and 6) Building extraction. The book is a valuable resource for scientists, engineers, developers, instructors, and graduate students interested in lidar systems and data processing.

Over the past years, a great deal has been learned about variation in wood properties. Genetic control is a major source of variation in most wood properties. Wood is controlled genetically both directly in the developmental or internal processes of wood formation and indirectly by the control of tree form and growth patterns. Emphasis in this book will be on the internal control of wood production by genetics although there will be two chapters dealing with the indirect genetic control of wood, which was covered in detail in the previous book by Zobel and van Buijtenen (1989). The literature on the genetics of wood is very variable, so quite superficial, on which little reliance can be placed, and some from well-designed and correctly executed research. When suitable, near the end of each chapter, there will be a summary with the authors' interpretation of the most important information in the chapter. The literature on the genetics of wood can be quite controversial. This is to be expected, since both the environment and its interaction with the genotype of the tree can have a major effect on wood properties, especially when trees of similar genotypes are grown under widely divergent conditions. Adding to the confusion, studies frequently have been designed and analyzed quite differently, resulting in conflicting assessments of results.
Optical Approaches to Capture Plant Dynamics in Time, Space, and Across Scales - Eetu Puttonen
2018-08-17 Quantifying temporal changes in plant geometry as a result of genetic, developmental, or environmental causes is essential to improve our understanding of the structure and function relationships in plants. Over the last decades, optical imaging and remote sensing developed fundamental working tools to monitor and
quantify our environment and plants in particular. Increased efficiency of methods lowered the barrier to compare, integrate, and interpret the optically obtained plant data across larger spatial scales and across scales of biological organization. In particular, acquisition speed at high resolutions reached levels that allow capturing the temporal dynamics in plants in three dimensions along with multi-spectral information beyond human visual senses. These advanced imaging capabilities have proven to be essential to detect and focus on analyzing temporal dynamics of plant geometries. The focus of this Research Topic is on optical techniques developed to study geometrical changes at the plant level detected within the wavelength spectrum between near-UV to near infrared. Such techniques typically involve photogrammetric, LiDAR, or imaging spectroscopy approaches but are not exclusively restricted to these. Instruments operating within this range of wavelengths allow capturing a wide range of temporal scales ranging from sub-second to seasonal changes that result from plant development, environmental effects like wind and heat, or genetically controlled adaption to environmental conditions. The Research Topic covered a plethora of methodological approaches as suggestions for best practices in the light of a particular research question and to a wider view to different research disciplines and how they utilize their state-of-the-art techniques in demonstrating potential use cases across different scales.

Web and Wireless Geographical Information Systems - Sergio Di Martino
2020-10-21 This book constitutes the refereed proceedings of the 18th International Symposium on Web and Wireless Geographical Information Systems, W2GIS 2019, held in Wuhan, China, in November 2020. The 8 full papers presented together with 15 progress papers or short papers in the volume were carefully reviewed and selected from 40 submissions. The papers cover topics that
of UAVs for geographical data acquisition, and the ways to acquire and process the data. Provides a synthesis of ongoing research and a focus on the use of technology for small-scale image and spatial data acquisition in an environmental context. Written by experts of the technology who bring together UAS tools and resources for the environmental specialist Unmanned Aerial Remote Sensing: UAS for Environmental Applications is an excellent resource for any practitioner utilizing remote sensing and other geospatial technologies for environmental applications, such as conservation, research, and planning. Students and academics in information science, environment and natural resources, geosciences, and geography, will likewise find this comprehensive book a useful and informative resource.

**Digital Geoarchaeology**
Christoph Siart 2017-12-03
This book focusses on new technologies and multi-
method research designs in the field of modern archaeology, which increasingly crosses academic boundaries to investigate past human-environmental relationships and to reconstruct palaeolandscape. It aims at establishing the concept of Digital Geoarchaeology as a novel approach of interdisciplinary collaboration situated at the scientific interface between classical studies, geosciences and computer sciences. Among others, the book includes topics such as geographic information systems, spatiotemporal analysis, remote sensing applications, laser scanning, digital elevation models, geophysical prospecting, data fusion and 3D visualisation, categorized in four major sections. Each section is introduced by a general thematic overview and followed by case studies, which vividly illustrate the broad spectrum of potential applications and new research designs. Mutual fields of work and common technologies are identified and discussed from different scholarly perspectives. By stimulating knowledge transfer and fostering interdisciplinary collaboration, Digital Geoarchaeology helps generate valuable synergies and contributes to a better understanding of ancient landscapes along with their forming processes. Chapters 1, 2, 6, 8 and 14 are published open access under a CC BY 4.0 license at link.springer.com.

National Forest Inventories: Contributions to Forest Biodiversity Assessments-Gherardo Chirici 2011-01-04 Forest biodiversity is crucial to the ecological, economic, and social well-being of earth’s civilisations. Unfortunately, however, forest biodiversity is threatened to a serious degree in nearly all countries. Therefore, many countries have agreed to be parties to international agreements focused on maintaining, restoring, and monitoring biodiversity; further, these countries have agreed to report to international bodies on forest biodiversity status and trends. NFIs are the
primary source of large-scale information available for this purpose, but the large variety of definitions, protocols, sampling designs, and plot configurations used by NFIs makes comparable international reporting extremely difficult. This book presents the results of Working Group 3 of COST Action E43 in the development of harmonization techniques for common reporting of estimates of forest biodiversity indicators using NFI data. Harmonization tests were carried out on a large common data base containing raw NFI data from 13 European countries and the USA. With its collection of practical examples for the estimation of forest biodiversity indicators, it's a practical tool for anyone involved in forest inventories and in forest resource monitoring and management as well as for those involved in biodiversity assessment and reporting.

Structure from Motion in the Geosciences - Jonathan L. Carrivick 2016-07-15

Structure from Motion with Multi View Stereo provides hyperscale landform models using images acquired from standard compact cameras and a network of ground control points. The technique is not limited in temporal frequency and can provide point cloud data comparable in density and accuracy to those generated by terrestrial and airborne laser scanning at a fraction of the cost. It therefore offers exciting opportunities to characterise surface topography in unprecedented detail and, with multi-temporal data, to detect elevation, position and volumetric changes that are symptomatic of earth surface processes. This book firstly places Structure from Motion in the context of other digital surveying methods and details the Structure from Motion workflow including available software packages and assessments of uncertainty and accuracy. It then critically reviews current usage of Structure from Motion in the geosciences, provides a synthesis of recent validation studies and looks to the future by highlighting opportunities arising from developments in
allied disciplines. This book will appeal to academics, students and industry professionals because it balances technical knowledge of the Structure from Motion workflow with practical guidelines for image acquisition, image processing and data quality assessment and includes case studies that have been contributed by experts from around the world.

**Laser Scanning Systems in Highway and Safety Assessment** - Biswajeet Pradhan 2019-04-02

This book aims to promote the core understanding of a proper modelling of road traffic accidents by deep learning methods using traffic information and road geometry delineated from laser scanning data. The first two chapters of the book introduce the reader to laser scanning technology with creative explanation and graphical illustrations, review and recent methods of extracting geometric road parameters. The next three chapters present different machine learning and statistical techniques applied to extract road geometry information from laser scanning data. Chapters 6 and 7 present methods for modelling roadside features and automatic road geometry identification in vector data. After that, this book goes on reviewing methods used for road traffic accident modelling including accident frequency and injury severity of the traffic accident (Chapter 8). Then, the next chapter explores the details of neural networks and their performance in predicting the traffic accidents along with a comparison with common data mining models. Chapter 10 presents a novel hybrid model combining extreme gradient boosting and deep neural networks for predicting injury severity of road traffic accidents. This chapter is followed by deep learning applications in modelling accident data using feed-forward, convolutional, recurrent neural network models (Chapter 11). The final chapter (Chapter 12) presents a procedure for modelling traffic accident with little data based on the concept of
transfer learning. This book aims to help graduate students, professionals, decision makers, and road planners in developing better traffic accident prediction models using advanced neural networks.

**National Forest Inventories**-Erkki Tomppo

2009-12-02 Forest inventories throughout the world have evolved gradually over time. The content as well as the concepts and definitions employed are constantly adapted to the users’ needs. Advanced inventory systems have been established in many countries within Europe, as well as outside Europe, as a result of development work spanning several decades, in some cases more than 100 years. With continuously increasing international agreements and commitments, the need for information has also grown drastically, and reporting requests have become more frequent and the content of the reports wider. Some of the agreements made at the international level have direct impacts on national economies and international decisions, e. g., the Kyoto Protocol. Thus it is of utmost importance that the forest information supplied is collected and analysed using sound scientific principles and that the information from different countries is comparable.

European National Forest Inventory (NFI) teams gathered in Vienna in 2003 to discuss the new challenges and the measures needed to get data users to take full advantage of existing NFIs. As a result, the European National Forest Inventory Network (ENFIN), a network of NFIs, was established. The ENFIN members decided to apply for funding for meetings and collaborative activities. COST-European Cooperation in Science and Technology - provided the necessary financial means for the realization of the program.

**Mapping of Landslides Under Forest Using High Resolution Lidar Data**-S.N. Suprijatna 2011
Sensing the Past-Nicola Masini 2017-04-06 This book provides a complete overview of novel and state of art sensing technologies and geotechnologies relevant to support management and conservation of CH sites, monuments and works of art. The book is organized in an introduction stating the motivations and presenting the overall content of the volume and four parts. The first part focuses on remote sensing and geophysics for the study of human past and cultural heritage at site scale and as element of the surrounding territory. The second part presents an overview of non invasive technologies for investigating monuments and works of art. The third part presents the new opportunities of ICT for an improved and safe cultural heritage fruition, from the virtual and augmented reality of historical context to artifact tracking. Finally, the forth part presents a significant worldwide set of success cases of the exploitation of the integration of geotechnologies in archeology and architectural heritage management. This book is of interest to researchers, experts of heritage science, archaeologists, students, conservators and other professionals of cultural heritage.

The Australian Soil Classification-, National Committee on Soil and Terrain 2016-01-21 The Australian Soil Classification provides a framework for organising knowledge about Australian soils by allocating soils to classes via a key. Since its publication in 1996, this book has been widely adopted and formally endorsed as the official national system. It has provided a means of communication among scientists and land managers and has proven to be of particular value in land resource survey and research programs, environmental studies and education. Classification is a basic requirement of all science and needs to be periodically revised as knowledge increases. This Second Edition of The Australian Soil Classification includes updates from a working group.
of the National Committee on Soil and Terrain (NCST), especially in regards to new knowledge about acid sulfate soils (sulfidic materials). Modifications include expanding the classification to incorporate different kinds of sulfidic materials, the introduction of subaqueous soils as well as new Vertosol subgroups, new Hydrosol family criteria and the consistent use of the term reticulate. All soil orders except for Ferrosols and Sodosols are affected by the changes.