Efficient Crop Type Mapping Based On Remote Sensing In The

Renewable raw materials are becoming increasingly important as an alternative resource base in industrial networks. Consequently, research for methods improving the efficient use of renewable resources in production processes with by-products is crucial. The aim is cascade utilization, thus the multiple utilization of a raw material before its conversion into energy. The International Conference on Resource Efficiency in Interorganizational Networks (ResEff) brings together interdisciplinary researchers developing strategies and solution concepts for efficient resource utilization. It is therefore a platform for scientific exchange both between experts as well as interdisciplinary groups from agricultural and forestry science, mathematical optimization, operations research, marketing, business informatics, production and logistics. The following facets of the challenging topic of resource efficiency in interorganizational networks are covered: Materials, technologies, planning of production and value-added networks for renewable resources as well as governance, coordination and sale of products from renewable resources.

Crop models and remote sensing techniques have been combined and applied in agriculture and crop estimation on local and regional scales, or worldwide, based on the simultaneous development of crop models and remote sensing. The literature shows that many new remote sensing sensors and valuable methods have been developed for the retrieval of canopy state variables and soil properties from remote sensing data for assimilating the retrieved variables into crop models. At the same time, remote sensing has been used in a staggering number of applications for agriculture. This book sets the context for remote sensing and modelling for agricultural systems as a mean to minimize the environmental impact, while increasing production and productivity. The eighteen papers published in this Special Issue, although not representative of all the work carried out in the field of Remote Sensing for agriculture and crop modeling, provide insight into the diversity and the complexity of developments of RS applications in agriculture. Five thematic focuses have emerged from the published papers: yield estimation, land cover mapping, soil nutrient balance, time-specific management zone delineation and the use of UAV as agricultural aerial sprayers. All contributions exploited the use of remote sensing data from different platforms (UAV, Sentinel, Landsat, QuickBird, CBERS, MODIS, WorldView), their assimilation into crop models (DSSAT, AQUACROP, EPIC, DELPHI) or on the synergy of Remote Sensing and modeling, applied to cardamom, wheat, tomato, sorghum, rice, sugarcane and olive. The intended audience is researchers and postgraduate students, as well as those outside academia in policy and practice.

This book offers a systematic investigation of the ecological and environmental issues related to the land cover changes in Nepal by researchers from both China and Nepal. It discusses the eco-environmental issues faced by Nepal, particularly in the hills and mountain regions. It also sheds light on the global concerns regarding the eco-environment issues of mountains, and analyzes the various causes and potential consequences of eco-environmental degradation in Nepal. The book is of particular interest to students, researchers, experts, and decision-makers wanting to gain a general overview of land cover in Nepal and its dynamics, environment and natural resources, as well as mountain hazards.

Advances in Agronomy, Volume 161, continues to be recognized as a leading reference and first-rate source for the latest research in agronomy. Each volume contains an eclectic group of reviews by leading scientists throughout the world. As always, the subjects covered are rich, varied and exemplary of the abundant subject matter addressed by this long-running serial.

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As metropolises continue to see a growth in population, planners are continually searching for trending methods for utilizing space and seeking the best geographical arrangements for these cities. Professionals have continually used geographic information systems (GIS) to solve these issues; however, limitations in this technology remain prevalent. Integrating multiple-criteria decision analysis and evolutionary computing tools with GIS has created an array of robust solutions for spatial optimization problems in densely populated areas. Interdisciplinary Approaches to Spatial Optimization Issues is a pivotal reference source that provides vital research on advancements within the field of GIS and evolutionary solutions for spatial optimization issues. While highlighting topics such as computing machinery, vehicular routing, and operational research, this publication is ideally designed for practitioners, technicians, developers, academicians, students, government officials, planners, and researchers seeking current research on applications and improvements within spatial optimization and GIS.

Most agricultural systems in California's Central Valley are purposely flexible and intentionally designed to meet the demands of dynamic markets. Agricultural land use is also impacted by climate change and urban development. As a result, crops change annually and semiannually, which makes estimating agricultural water use difficult, especially given the existing method by which agricultural land use is identified and mapped. A minor portion of agricultural land is surveyed annually for land-use type, and every 5 to 8 years the entire valley is completely evaluated. So far no effort has been made to effectively and efficiently identify specific crop types on an annual basis in this area. The potential of satellite imagery to map agricultural land cover and estimate water usage in the Central Valley is explored. Efforts are made to minimize the cost and reduce the time of production during the mapping process. The land use change analysis shows that a remote sensing based mapping method is the only means to map the frequent change of major crop types. The traditional maximum likelihood classification approach is first utilized to map crop types to test the classification capacity of existing algorithms. High accuracy is achieved with sufficient ground truth data for training, and crop maps of moderate quality can be timely produced to facilitate a near-real-time water use estimate. However, the large set of ground truth data required by this method results in high costs in data collection. It is difficult to reduce the cost because a trained classification algorithm is not transferable between different years or different regions. A phenology based classification (PBC) approach is developed which extracts phenological metrics from annual vegetation index profiles and identifies crop types based on these metrics using decision trees. According to the comparison with traditional maximum likelihood classification, this phenology-based approach shows great advantages when the size of the training set is limited by ground truth availability. Once developed, the classifier is able to be applied to different years and a vast area with only a few adjustments according to local agricultural and annual weather conditions. 250 m MODIS imagery is utilized as the main input to the PBC algorithm and displays promising capacity in crop identification in several counties in the Central Valley. A time series of Landsat TM/ETM+ images at a 30 m resolution is necessary in the crop mapping of counties with smaller land parcels, although the processing time is longer. Spectral characteristics are also employed to identify crops in PBC. Spectral signatures are associated with phenological stages instead of imaging dates, which highly increases the stability of the classifier performance and

overcomes the problem of over-fitting. Moderate accuracies are achieved by PBC, with confusions mostly within the same crop categories. Based on a quantitative analysis, misclassification in PBC has very trivial impacts on the accuracy of agricultural water use estimate. The cost of the entire PBC procedure is controlled to a very low level, which will enable its usage in routine annual crop mapping in the Central Valley.

This book proposes new technologies and discusses future solutions for ICT design infrastructures, as reflected in high-quality papers presented at the 4th International Conference on ICT for Sustainable Development (ICT4SD 2019), held in Goa, India, on 5–6 July 2019. The conference provided a valuable forum for cutting-edge research discussions among pioneering researchers, scientists, industrial engineers, and students from all around the world. Bringing together experts from different countries, the book explores a range of central issues from an international perspective.

Land, as a fundamental resource in regional development, provides major opportunities for farming, housing, urban planning, and financing. In order to meet the requirements of the new era, every state has developed and implemented a series of policies according to its national specificities and to the international regulations and trends. Geospatial Technologies for Effective Land Governance is a pivotal reference source that provides vital research on the application of the use of GNSS, remote sensing, and GIS. While highlighting topics such as crop management, multispectral images, and irrigation, this publication explores land administration, encompassing both cadastral systems and land registration, as well as the methods of land governance strategies. This book is ideally designed for researchers, agricultural professionals, engineers, environmentalists, land developers, educators, students, and policymakers seeking current research on land and land-based conflicts in urban and rural communities.

This superb volume provides a critical assessment of genomics tools and approaches for crop breeding. Volume 1 presents the status and availability of genomic resources and platforms, and also devises strategies and approaches for effectively exploiting genomics research. Volume 2 goes into detail on a number of case studies of several important crop and plant species that summarize both the achievements and limitations of genomics research for crop improvement.

In a rapidly changing world, there is an ever-increasing need to monitor the Earth’s resources and manage it sustainably for future generations. Earth observation from satellites is critical to provide information required for informed and timely decision making in this regard. Satellite-based earth observation has advanced rapidly over the last 50 years, and there is a plethora of satellite sensors imaging the Earth at finer spatial and spectral resolutions as well as high temporal resolutions. The amount of data available for any single location on the Earth is now at the petabyte-scale. An ever-increasing capacity and computing power is needed to handle such large datasets. The Google Earth Engine (GEE) is a cloud-based computing platform that was established by Google to support such data processing. This facility allows for the storage, processing and analysis of spatial data using centralized high-power computing resources, allowing scientists, researchers, hobbyists and anyone else interested in such fields to mine this data and understand the changes occurring on the Earth’s surface. This book presents research that applies the Google Earth Engine in mining, storing, retrieving and processing spatial data for a variety of applications that include vegetation monitoring, cropland mapping, ecosystem assessment, and gross primary productivity, among others. Datasets used range from coarse spatial resolution data, such as MODIS, to medium resolution datasets (Worldview -2), and the studies cover the entire globe at varying spatial and temporal scales.

The advances in unmanned aerial vehicle (UAV) platforms and onboard sensors in the past few years have greatly increased our ability to monitor and map crops. The ability to register images at ultrahigh spatial resolution at any moment has made remote sensing techniques increasingly useful in crop management. These technologies have revolutionized the way in which remote sensing is applied in precision agriculture, allowing for decision-making in a matter of days instead of weeks. However, it is still necessary to continue research to improve and maximize the potential of UAV remote sensing in agriculture. This Special Issue of Remote Sensing includes different applications of UAV remote sensing for crop management, covering RGB, multispectral, hyperspectral and light detection and ranging (LiDAR) sensor applications aboard UAVs. The papers reveal innovative techniques involving image analysis and cloud points. However, it should be emphasized that this Special Issue is a small sample of UAV applications in agriculture and that there is much more to investigate.

Fertilizer suitability mapping is the way of determining nutrients demanded by specific crop type on the basis of soil sample testing results. It is a very important method for modern precision agriculture to increase fertilizer use efficiency and environmental friendliness. In order to make efficient fertilizer application for wheat at Lume Watershed, the book tried to map the plant macro nutrients, physical land suitability and diammonium phosphate (DAP) suitability for wheat. Starting from soil sample collection to final map, standard laboratory analysis methods plus GIS and remote sensing tools were used. Because both potassium and nitrogen showed non-significant variation within the watershed, fertilizer suitability map was only made for phosphorous variability. The DAP requirement for wheat was determined as the deference of phosphorous critical level for wheat from initial phosphorus level in the soil. Finally by applying Krignig interpolation DAP suitability map was prepared for wheat. The DAP requirement map of the area reveals that about 51.38%, 20.25%, 18.40% and 8.43% need 50 to75 kg/ha, 75 to 100kg/ha, 25 to 50kg/ha and greater than 100kg/ha respectively.

This book gathers selected high-quality papers presented at the International Conference on Machine Learning and Computational Intelligence (ICMLCI-2019), jointly organized by Kunming University of Science and Technology and the Interscience Research Network, Bhubaneswar, India, from April 6 to 7, 2019. Addressing virtually all aspects of intelligent systems, soft computing and machine learning, the topics covered include: prediction; data mining; information retrieval; game playing; robotics; learning methods; pattern visualization; automated knowledge acquisition; fuzzy, stochastic and probabilistic computing; neural computing; big data; social networks and applications of soft computing in various areas.

The sustainable development of the agriculture sector is the only option to meet the demands of increased and economically viable production in a changing climate. This means there is a need to introduce the latest technologies to enhance production, and also help policymakers make decisions for the future. Geospatial technologies & tools, such as remote sensing, geographical information systems (GIS), global positioning systems (GPS), and mobile & web applications, provide unique capabilities to analyze multi-scale, multi-temporal datasets, and support decision-making in sustainable agriculture

development and natural resources management. Further, the availability of reliable and timely geospatial information on natural resources and environmental conditions is essential for sustainable agricultural development and food security. Since remote sensing solutions are fast, non-destructive and have large spatial coverage, they can play a significant role in the identification, inventory, and mapping of land resources. Over the past four decades, remote sensing has proved to be a cost-effective and powerful tool to assess crop and soil properties in varying spatial and temporal scales using both visual and digital techniques. Satellite remote sensing coupled with GIS & mobile-app based positional information has emerged as an efficient tool for optimizing input resources, and minimizing cost of production and risk of biotic/ abiotic factors nature to promote sustainable agriculture. This book comprehensively documents the applications of space-based technologies for crop and soil assessments for the sustainable development of agriculture.

Section I: Technical considerations for rice-based farming systems: irrigation system management; Section II: Technical considerations for rice-based farming systems: farm-level management; Section III: Technical considerations for rice-based farming systems: farming systems; Section IV: Synthesis papers.

This book describes and analyses various aspects of Israeli climate. This work also elucidates how both man and nature adjust to various climates. The first part (Chapters 1-9) deals with the meteorological and climatological network stations, the history of climate research in Israel, analysis of the local climate by season, and a discussion of the climate variables their spatial and temporal distribution. The second part (Chapters 10-14) of this work is devoted to a survey of applied climatology. This part presents information on weather forecasting, rainfall enhancement, air quality monitoring, and various climatological aspects of planning. There is no sharp division between theoretical and applied climatology topics. Moreover, though various sections seem exclusively theoretical, they also include important applications for various real life situations (such as rainfall intensities (Section 5. 3), frost, frost damage (Section 6. 2. 4), degree-days (Section 6. 2. 5) and heat stress (Section 6. 2. 6). Professionals and university students of geography and earth science, meteorology and climatology, even high school students majoring in geography will be able to use this book as a basic reference work. Researchers in atmospheric science can also use this work as an important source of reference. Students of agriculture will also gain theoretical and practical insights. Even architects and engineers will gain another perspective in their fields.

The Salt River Basin in northeastern Missouri is the major water supply source for people in the region. There is a need to build a long term simulation and to validate the long term trend of pollutant concentrations in the basin. Remote sensing is a potential resource to support land-use evaluation. It provides the capability to evaluate dynamic landscape pattern and observe changes and trends across a large scale pattern through time. This research applied Landsat 5 Thematic Mapper (TM) data to build crop type maps for the Salt River Basin for a two-year period (2005 and 2006) useful in evaluating land-use management with crop phenological profiles analyzed with MODIS NDVI. The results showed that crop type classification in 2005 had a greater accuracy than that of 2006. The primary reason was that there were more in-season Landsat data available in 2005 than in 2006. This method was efficient in classifying crops when there was lack of cloud-free images during the growing season as indicated by an overall accuracy of 90% in 2006. Combining this method with statistical analysis using additional ground-truth samples for building the NDVI profile has potential as a robust technique for crop classification in cloud-free-limited Landsat data application useful in other studies.

With the growing popularity and availability of precision equipment, farmers and producers have access to more data than ever before. With proper implementation, precision agriculture management can improve profitability and sustainability of production. Precision Agriculture Basics is geared at students, crop consultants, farmers, extension workers, and practitioners that are interested in practical applications of site-specific agricultural management. Using a multidisciplinary approach, readers are taught to make data-driven on-farm decisions using the most current knowledge and tools in crop science, agricultural engineering, and geostatistics. Precision Agriculture Basics also features a stunning video glossary including interviews with agronomists on the job and in the field.

This handbook presents the detailed steps for national agricultural land cover mapping, conducted with limited resources and budget from design to final validation and production. It covers the technical aspects of 1) selection and preprocess of satellite imagery (both optical and radar), 2) definition of a land cover legend using international standards, 3) the integration with other existing information as well as the analysis of such database in order to assign a thematic classification, 4) the interpretation, 5) the accuracy assessment and 6) the final packaging and publication of results. The handbook focuses on mapping agricultural land, in a complex landscape, such as the one found in Lao PDR, where atmospheric conditions, topographic effects and management makes the classification challenging. The handbook also presents practical examples of the team, software and skill-set required to develop a national land cover dataset. The objective of the document is to provide a working manual to other national teams willing to develop a land cover mapping programme.

Legumes have played an important part as human food and animal feed in cropping systems since the dawn of agriculture. The legume family is arguably one of the most abundantly domesticated crop plant families. Their ability to symbiotically fix nitrogen and improve soil fertility has been rewarded since antiquity and makes them a key protein source. Pea was the original model organism used in Mendel´s discovery of the laws of inheritance, making it the foundation of modern plant genetics. This book based on Special Issue provides up-to-date information on legume biology, genetic advances, and the legacy of Mendel.

Deep learning includes a subset of machine learning for processing the unsupervised data with artificial neural network functions. The major advantage of deep learning is to process big data analytics for better analysis and self-adaptive algorithms to handle more data. When applied to engineering, deep learning can have a great impact on the decision-making process. Deep Learning Applications and Intelligent Decision Making in Engineering is a pivotal reference source that provides practical applications of deep learning to improve decision-making methods and construct smart environments. Highlighting topics such as smart transportation, e-commerce, and cyber physical systems, this book is ideally designed for engineers, computer scientists, programmers, software engineers, research scholars, IT professionals, academicians, and postgraduate students seeking current research on the implementation of automation and deep learning in various engineering disciplines.

Integrated Pest Management: Current Concepts and Ecological Perspective presents an overview of alternative measures to traditional pest management practices using biological control and biotechnology. The removal of some highly effective broad-spectrum chemicals, caused by concerns over environmental health and public safety, has resulted in the development of alternative, reduced risk crop protection products. These products, less toxic to the environment and easily integrated into biological control systems, target specific life stages or pest species. Predation — recognized as a suitable, long-term strategy — effectively suppresses pests in biotechnological control systems. Integrated Pest Management covers these topics and more. It explores the current ecological approaches in alternative solutions, such as biological control agents, parasites and predators, pathogenic microorganisms, pheromones and natural products

as well as ecological approaches for managing invasive pests, rats, suppression of weeds, safety of pollinators, role of taxonomy and remote sensing in IPM and future projections of IPM. This book is a useful resource to entomologists, agronomists, horticulturists, and environmental scientists. Fills a gap in the literature by providing critical analysis of different management strategies that have a bearing on agriculture, sustainability and environmental protection Synthesizes research and practice on integrated pest management Emphasizes an overview of management strategies, with critical evaluation of each in the larger context of ecologically based pest management

This book constitutes Part III of the refereed four-volume post-conference proceedings of the 4th IFIP TC 12 International Conference on Computer and Computing Technologies in Agriculture, CCTA 2010, held in Nanchang, China, in October 2010. The 352 revised papers presented were carefully selected from numerous submissions. They cover a wide range of interesting theories and applications of information technology in agriculture, including simulation models and decision-support systems for agricultural production, agricultural product quality testing, traceability and e-commerce technology, the application of information and communication technology in agriculture, and universal information service technology and service systems development in rural areas.

Arising from a scientific conference marking the 100th anniversary of her birth, this book honors the life and work of the social scientist and diplomat Ester Boserup, who blazed new trails in her interdisciplinary approach to development and sustainability.

With the current world population growth of 1.2%, the earth can expect to house 9-10 billion people by 2050. Food production, too, must increase to accommodate these numbers. Easy growing, high calorie, nutritious foods, such as bananas are the top priority as a solution to this imminent problem. The first comprehensive compendium on bananas in rec