Lung Cancer Detection Using Image Processing Techniques

This book includes high-quality, peer-reviewed papers from the International Conference on Recent Advancement in Computer, Communication and Computational Sciences (RACCCS-2018), held at Aryabhatta College of Engineering & Research Center, Ajmer, India on August 10–11, 2018, presenting the latest developments and technical solutions in computational sciences. Networking and communication are the backbone of data science, data- and knowledge engineering, which have a wide scope for implementation in engineering sciences. This book offers insights that reflect the advances in these fields from upcoming researchers and leading academicians across the globe. Covering a variety of topics, such as intelligent hardware and software design, advanced communications, intelligent computing technologies, advanced software engineering, the web and informatics, and intelligent image processing, it helps those in the computer industry and academia use the advances in next-generation communication and computational technology to shape real-world applications.

The aim of this conference is to allow participants an opportunity to discuss the recent developments in the field of computation technologies and review challenges faced by the community in the 21st century. The conference consists of invited oral presentations and contributed posters to ensure an intense interaction amongst the researchers present at the conference, only a single session will be in progress at any given time. Students are encouraged through a reduced registration fee and the possibility of limited logistical support. Best student papers will be judged and awarded during the conference.

Lung cancer remains the leading cause of cancer-related deaths worldwide. Early diagnosis can improve the effectiveness of treatment and increase a patient's chances of survival. Thus, there is an urgent need for new technology to diagnose small, malignant lung nodules early as well as large nodules located away from large diameter airways because the current technology—namely, needle biopsy and bronchoscopy—fails to diagnose those cases. However, the analysis of small, indeterminate lung masses is fraught with many technical difficulties. Often patients must be followed for years with serial CT scans in order to establish a diagnosis, but inter-scan variability, slice selection artifacts, differences in degree of inspiration, and scan angles can make comparing serial scans unreliable. Lung Imaging and Computer Aided Diagnosis brings together researchers in pulmonary image analysis to present state-of-the-art image processing techniques for detecting and diagnosing lung cancer at an early stage. The book addresses variables and discrepancies in scans and proposes ways of evaluating small lung masses more consistently to allow for more accurate measurement of growth rates and analysis of shape and appearance of the detected lung nodules. Dealing with all aspects of image analysis of the data, this book examines: Lung segmentation, Nodule detection, Vessel segmentation, Airways segmentation, Lung registration, Detection of lung nodules, Diagnosis of detected lung nodules, Shape and appearance analysis of lung nodules.

Contributors also explore the effective use of these methodologies for diagnosis and therapy in clinical applications. Arguably the first book of its kind to address and evaluate image-based diagnostic approaches for the early diagnosis of lung cancer, Lung Imaging and Computer Aided Diagnosis constitutes a valuable resource for biomedical engineers, researchers, and clinicians in lung disease imaging.
The main aim of this conference is to bring together academicians, researchers, scientists and working professionals to have a brainstorming session on the current trends towards converging technologies related to electrical, electronics, communication and computer engineering.

2020 International Conference on Advanced Computing & Communication Systems (ICACCS) aims at exploring the interface between the industry and real time environment with state of the art techniques. ICACCS 2020 publishes original and timely research papers and survey articles in current areas of sustainable computing, energy, smart city, temperature, power and environment related research areas of current importance to readers.

Access comprehensive, multidisciplinary guidance on the diagnosis and treatment of lung cancer! This new resource addresses the full range of clinical issues in diagnosis, staging, and treatment, as well as the latest scientific data and evidence-based guidelines. A user-friendly organization provides quick reference to data summaries, as well as more comprehensive and detailed information for readers who wish to explore topics in depth. Features contributions by authors from many different disciplines, to ensure a balanced approach. Addresses the clinical issues seen in practice, with the inclusion of basic science research topics that are likely to be put into clinical practice soon. Integrates evidence-based medicine throughout. Assesses the strength of all available data enabling readers to weigh different arguments and make decisions based on medical issues, values, and the availability and efficacy of interventions using a data rating system. Addresses difficult, but clinically relevant issues for which limited data is available. Enables readers to quickly reference findings and data in data summary statements and summary tables.

Lung cancer is a major cause of cancer-related deaths in men and women. However, since the first edition of Lung Cancer was published 14 years ago, rapid progress in the biology, prevention, diagnosis, and treatment of the disease has been made.

This book presents new theories and working models in the area of data analytics and learning. The papers included in this volume were presented at the first International Conference on Data Analytics and Learning (DAL 2018), which was hosted by the Department of Studies in Computer Science, University of Mysore, India on 30–31 March 2018. The areas covered include pattern recognition, image processing, deep learning, computer vision, data analytics, machine learning, artificial intelligence, and intelligent systems. As such, the book offers a valuable resource for researchers and practitioners alike.

Developing an effective computer-aided diagnosis (CAD) system for lung cancer is of great clinical importance and can significantly increase the patient's chance for survival. For this reason, CAD systems for lung cancer have been investigated in a large number of research studies. A typical CAD system for lung cancer diagnosis is composed of four main processing steps: segmentation of the lung fields, detection of nodules inside the lung fields, segmentation of the detected nodules, and diagnosis of the nodules as benign or malignant. This book overviews the current state-of-the-art techniques that have been developed to implement each of these CAD processing steps. Overviews the latest state-of-the-art diagnostic CAD systems for lung cancer imaging and diagnosis. Offers detailed coverage of 3D and 4D image segmentation. Illustrates unique fully automated detection systems coupled with 4D Computed Tomography (CT). Written by authors who are world-class researchers in the biomedical imaging sciences. Includes extensive references at the end of each chapter to enhance further study. Ayman El-Baz is a professor, university scholar, and chair of the Bioengineering Department at the University of Louisville, Louisville, Kentucky. He earned his bachelor's and master's degrees in electrical engineering in 1997 and 2001, respectively. He earned his doctoral degree in electrical engineering from the University of Louisville in 2006. In 2009, he was named a Coulter Fellow for his contributions to the field of biomedical translational research. He has 17 years of hands-on experience in the fields of bio-imaging modeling and noninvasive computer-assisted diagnosis systems. He has authored or coauthored more than 500 technical articles (132 journals, 23 books, 57 book chapters, 211 refereed-conference papers, 137 abstracts, and 27 U.S. patents and disclosures). Jasjit S. Suri is an innovator, scientist, a visionary, an industrialist, and an internationally known world leader in biomedical engineering. He has spent over 25 years in the field of biomedical engineering/devices and its management. He received his doctorate from the University of Washington, Seattle, and his business management sciences degree from Weatherhead School of Management, Case Western Reserve University, Cleveland, Ohio. He was awarded the President's Gold Medal in 1980 and named a Fellow of the American Institute of Medical and Biological Engineering for his outstanding contributions in 2004. In 2018, he was awarded the Marquis Life Time Achievement Award for his outstanding contributions and dedication to medical imaging and its management.

This book includes high-quality papers presented at the Symposium 2019, organised by Sikkim Manipal Institute of Technology (SMIT), in Sikkim from 26–27 February 2019. It discusses common research problems and challenges in medical image analysis, such as deep learning methods. It also discusses how these theories can be applied to a broad range of application areas, including lung and chest x-ray, breast CAD, microscopy and pathology. The studies included mainly focus on the detection of events from biomedical signals.

This book gathers state-of-the-art research in computational engineering and bioengineering to facilitate knowledge exchange between various scientific communities. Computational engineering
Lung cancer is one of the most common cancers in both men and women worldwide. Early diagnosis of lung cancer can significantly increase the chances of a patient’s survival, yet early detection has historically been difficult. As a result, there has been a great deal of progress in the development of accurate and fast diagnostic tools in recent years. Lung Cancer and Imaging provides an introduction to both the methods currently used in lung cancer diagnosis and the promising new techniques that are emerging. Areas covered include the major trends and challenges in lung cancer detection and diagnosis, classification of cancer types, lung feature extraction in joint PET/CT images, and algorithms in the area of low dosage CT lung cancer images.

Cardiovascular disease is a common cause of morbidity and mortality in people with diabetes, and it is an issue that is becoming increasingly important to cardiologists and specialists in diabetes. This second edition has been updated to include new trial data, new drugs and updates on treatment of diabetes in heart failure patients.

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This book discusses major issues and advances in the diagnosis and treatment of incidentally detected early-stage lung cancer (ESLC). In Part I, pathology and radiology experts comprehensively review the state-of-the-art advances in individual research fields, and offer an update on the cross-sectional anatomy of the lung and post-processing techniques for CT imaging. Part II focuses on the imaging features, differential diagnosis, and radiologic-pathologic correlations of ESLCs in the categories pGGN, mGGN, and solid nodules in compliance with the Guidelines on Lung Cancer Screening from the National Comprehensive Cancer Network (NCCN). Part III briefly introduces therapeutic management strategies for ESLCs, including surgical and non-surgical approaches, for instance stereotactic ablative radiation therapy (SABR) and radiofrequency ablation (RFA). Lastly, the authors have meticulously prepared 50 clinical cases of pathologically proven benign and malignant pulmonary nodules with in-depth discussion and experts' comments to further readers' understanding of practical imaging and management strategies of ESLCs.

The Kuala Lumpur International Conference on Biomedical Engineering (BioMed 2006) was held in December 2006 at the Palace of the Golden Horses, Kuala Lumpur, Malaysia. The papers presented at BioMed 2006, and published here, cover such topics as Artificial Intelligence, Biological effects of non-ionising electromagnetic fields, Biomaterials, Biomechanics, Biomedical Sensors, Biomedical Signal Analysis, Biotechnology, Clinical Engineering, Human performance engineering, Imaging, Medical Informatics, Medical Instruments and Devices, and many more.

The research domains like Computing, Communication, Control and Automation has led to exponential increase in the number of people using these technologies and also their interest in research and development activities To prepare ourselves for this global competition, Pimpri Chinchwad College of Engineering, Pune has conceptualized the 4th International Conference on Computing Communication Control and Automation (ICCUBEA) 2018 under IEEE Pune Section during 16th to 18th August, 2018 This three days International Conference ICCUBEA 2018 will focus on the latest research trends and applications in the domains of Computing, Communication, Control and Automation This conference is designed to provide a common platform to the academicians, research scholars, industry experts and students to spread knowledge on scientific research in Interdisciplinary areas Also the pre conference tutorials by the esteemed experts will enrich the technical takeaways for the delegates

This proceedings book presents selected papers from the 4th Conference on Signal and Information Processing, Networking and Computers (ICSINNC) held in Qingdao, China on May 23–25, 2018. It focuses on the current research in a wide range of areas related to information theory, communication systems, computer science, signal processing, aerospace technologies, and other related technologies. With contributions from experts from both academia and industry, it is a valuable resource anyone interested in this field.

The public health burden from lung cancer is substantial: it is the second most commonly diagnosed cancer and the leading cause of cancer-related deaths in the United States. Given the individual and population health burden of lung cancer, especially when it is diagnosed at later stages, there has been a push to develop and implement screening strategies for early detection. However, many factors need to be considered for broad implementation of lung cancer screening in clinical practice. Effective implementation will entail understanding the balance of potential benefits and harms of lung cancer screening, defining and reaching eligible populations, addressing health disparities, and many more considerations. In recognition of the substantial challenges to developing effective lung cancer screening programs in clinical practice, the National Academies of Sciences, Engineering, and Medicine held a workshop in June 2016. At the workshop, experts described the current evidence base for lung cancer screening, the current challenges of implementation, and opportunities to overcome them. Workshop participants also explored capacity and access issues; best practices for screening programs; assessment of patient outcomes, quality, and value in lung cancer screening; and research needs that could improve implementation efforts. This publication summarizes the presentations and discussions from the workshop.

This two-volume set (CCIS 1229 and CCIS 1230) constitutes the refereed proceedings of the 5th International Conference on Recent Developments in Science, Engineering and Technology, REDSET 2019, held in Gurugram, India, in November 2019. The 74 revised full papers presented were carefully reviewed and selected from total 353 submissions. The papers are organized in topical sections on data centric programming; next generation computing; social and web analytics; security in data science analytics; big data analytics.

Lung cancer is the leading cause of cancer death in the United States, but IGRT (image guided radiation therapy) offers the possibility of more aggressive and enhanced treatments. The only available source on the subject that emphasizes new imaging techniques, and provides step-by-step treatment guidelines for lung cancer, this source helps clinic

ICOEI 2019 will provide an outstanding international forum for sharing knowledge and results in all fields of Engineering and Technology The primary goal of the conference is to promote research and developmental activities in Electronics and Informatics Another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working in India and abroad The conference is organized to make it an ideal platform for people to share views and experiences in Electronics, Informatics and related areas

This book constitutes the proceedings of the First International Conference on Computational Intelligence and Information Technology, CIIT 2011, held in Pune, India, in November 2011. The 58 revised full papers, 67 revised short papers, and 32 poster papers presented were carefully reviewed and selected from 483 initial submissions. The papers are contributed by innovative academics and industrial experts in the field of computer science, information technology, computational engineering, mobile communication and security and offer a stage to a common forum, where a constructive dialog on theoretical concepts, practical ideas and results of the state of the art can be developed.

There have been remarkable achievements in CT technology, workflow management and applications in the last couple of years. The introduction of 4- and 16-row multidetector technology has substantially increased acquisition speed and provides nearly isotropic resolution. These new technical possibilities had significant impact on the clinical use of CT and have yielded a broadening of the spectrum of applications, particularly in vascular, cardiac, abdominal, and trauma imaging. This book presents the practical experience of an international expert group of radiologists and physicists with state-of-the-art multidetector-technology. The chapters in this book will facilitate a thorough understanding of 4- and 16-slice multidetector-row CT and its clinical applications. This will help to fully exploit the diagnostic potential of this technology.

The book gathers high-quality research papers presented at the International Conference on Advanced Computing and Intelligent Engineering (ICACIE 2017). It includes technical sections describing progress in the fields of advanced computing and intelligent engineering, and is primarily intended for postgraduate students and researchers working in Computer Science and
Engineering. However, researchers working in Electronics will also find the book useful, as it addresses hardware technologies and next-gen communication technologies.

Nano-bioimaging is a real-time observation method for the study of biological processes in subcellular structures and entire cells. This technique aims to interfere as little as possible with life processes using nanoscale materials and probes. In this method, nanoscale photon source is often used for imaging, and 3D structure of the observed specimen is studied in detail without physical interference. Over the last decade, further boost in bioimaging has led to increase the nano-bioimaging impact that includes many improvements in the data analysis method, image processing, and molecular imaging technology. However, to increase the usage of nano-bioimaging, several developments in the field of diagnosis accuracy, photobleaching prevention, and controlling of the fluorescence resonance energy transfer (FRET) must be achieved. The purpose of this book is to provide a perspective on the current status of nano-bioimaging technologies.

This book constitutes the thoroughly refereed proceedings of the second International Symposium on Intelligent Systems Technologies and Applications (ISTA’16), held on September 21–24, 2016 in Jaipur, India. The 80 revised papers presented were carefully reviewed and selected from 210 initial submissions and are organized in topical sections on image processing and artificial vision, computer networks and distributed systems, intelligent tools and techniques and applications using intelligent techniques.

An intuitive, ingenious and powerful technique, sentinel lymph node biopsy has entered clinical practice with astonishing rapidity and now represents a new standard of care for melanoma and breast cancer patients, while showing great promise for the treatment of urologic, colorectal, gynecologic, and head and neck cancers. This text, written by international experts in the technique, provides a clear and comprehensive guide, presenting a detailed overview and discussing the various mapping techniques available and how these are applied in a number of leading institutions. This essential resource for surgical oncologists, pathologists, and specialists in nuclear medicine will also provide key information for those planning to start a sentinel lymph node program.

Approximately 40% of lung cancer patients will develop central nervous system (CNS) metastases during the course of their disease. Most of these are brain metastases, but up to 10% will develop leptomeningeal metastases. Known risk factors for CNS metastases development are small cell lung cancer (SCLC), adenocarcinoma histology, epidermal growth factor receptor (EGFR) mutant or anaplastic lymphoma kinase (ALK) rearranged lung cancer, advanced nodal status, tumor stage and younger age. CNS metastases can have a negative impact on quality of life (QoL) and overall survival (OS). The proportion of lung cancer patients diagnosed with CNS metastases has increased over the years due to increased use of brain imaging as part of initial cancer staging, advances in imaging techniques and better systemic disease control. Post contrast gadolinium enhanced magnetic resonance imaging (gd-MRI) is preferred, however when this is contra-indicated a contrast enhanced computed tomography (CE-CT) is mentioned as an alternative option. When CNS metastases are diagnosed, local treatment options consist of radiotherapy (stereotactic or whole brain) and surgery. Local treatment can be complicated by symptomatic radiation necrosis for which no high level evidence based treatment exists. Moreover, differential diagnosis with metastasis progression is difficult. Systemic treatment options have expanded over the last years. Until recently, chemotherapy was the only treatment option with a poor penetration in the CNS. Angiogenesis inhibitors are promising in the treatment of primary CNS tumors as well as radiation necrosis but clinical trials of anti-angiogenic inhibitors in NSCLC have largely excluded patients with CNS metastases. Furthermore, research has also focused on methods to prevent development of CNS disease, for example with prophylactic cranial irradiation. Recently, checkpoint inhibitors have become available for NSCLC patients, and tyrosine kinase inhibitors (TKIs) have improved prognosis significantly in those with a druggable driver mutation. Newer TKIs are often designed to have better CNS penetration compared to first-generation TKIs. Despite advances in treatment options CNS metastases remain a problem in lung cancer and cause morbidity and mortality. This Research Topic provides an extensive resource of articles describing advances in CNS metastases management in lung cancer patients, from prevention to diagnosis and treatment.

Lung cancer seems to be a common cause of death among people throughout the world. Lung cancer is the leading cancer killer in both men and women in the U.S. In 1987, it surpassed breast cancer to become the leading cause of cancer deaths in women. An estimated 158,080 Americans died from lung cancer in 2016, accounting for approximately 27 percent of all cancer deaths. Early detection of lung cancer can increase the chance of survival among people. The overall 5-year survival rate for lung cancer patients increases from 14 to 49% if the disease is detected in time.

Computed Tomography (CT) scans of lungs can be more efficient than X-ray or MRI scans in detecting the presence of cancer. The scanned images of lungs are obtained from LIDC (Lung Image Database Consortium). The scans of twenty patients contain both positive and negative scans, i.e., scans with and without tumor. The first step is to segment the tumor affected region from the lungs, for this we use Marker Controlled Watershed Segmentation from the Image Processing Toolbox. The next step is to extract the features using Feature Extraction methods from Computer Vision toolbox of MATLAB. Different extraction methods like GLCM, SURF, MSER and BRISK are used. The features are extracted from cancer detected images only. The data or the features extracted is in the form of matrix. These features are used to train the classifier, Support Vector Machine(SVM). SVM classifier is a supervised machine learning algorithm used as a tool for data classification with advantages in handling data with high dimensionality and a small sample size. The performance of the SVM is observed for each feature as input. Hence, a lung cancer detection system that employs Image Processing Techniques is used to detect the presence of lung cancer in CT- images. In this study, MATLAB is the software used.