

Computer Aided Detection And Diagnosis In Medical Imaging Imaging In Medical Diagnosis And Therapy

Architectural distortion is an important and early sign of breast cancer, but because of its subtlety, it is a common cause of false-negative findings on screening mammograms. Screening mammograms obtained prior to the detection of cancer could contain subtle signs of early stages of breast cancer, in particular, architectural distortion. This book presents image processing and pattern recognition techniques to detect architectural distortion in prior mammograms of interval-cancer cases. The methods are based upon Gabor filters, phase portrait analysis, procedures for the analysis of the angular spread of power, fractal analysis, Laws' texture energy measures derived from geometrically transformed regions of interest (ROIs), and Haralick's texture features. With Gabor filters and phase-portrait analysis, 4,224 ROIs were automatically obtained from 106 prior mammograms of 56 interval-cancer cases, including 301 true-positive ROIs related to architectural distortion, and from 52 mammograms of 13 normal cases. For each ROI, the fractal dimension, the entropy of the angular spread of power, 10 Laws' texture energy measures, and Haralick's 14 texture features were computed. The areas under the receiver operating characteristic (ROC) curves obtained using the features selected by stepwise logistic regression and the leave-one-image-out method are 0.77 with the Bayesian classifier, 0.76 with Fisher linear discriminant analysis, and 0.79 with a neural network classifier. Free-response ROC analysis indicated sensitivities of 0.80 and 0.90 at 5.7 and 8.8 false positives (FPs) per image, respectively, with the Bayesian classifier and the leave-one-image-out method. The present study has demonstrated the ability to detect early signs of breast cancer 15 months ahead of the time of clinical diagnosis, on the average, for interval-cancer cases, with a sensitivity of 0.8 at 5.7 FP/image. The presented computer-aided detection techniques, dedicated to accurate detection and localization of architectural distortion, could lead to efficient detection of early and subtle signs of breast cancer at pre-mass-formation stages.

Table of Contents: Introduction / Detection of Early Signs of Breast Cancer / Detection and Analysis of Oriented Patterns / Detection of Potential Sites of Architectural Distortion / Experimental Set Up and Datasets / Feature Selection and Pattern Classification / Analysis of Oriented Patterns Related to Architectural Distortion /

Detection of Architectural Distortion in Prior Mammograms / Concluding Remarks

Breast cancer is the most common type of cancer found in women worldwide; approximately 10 per cent of women are confronted with breast cancer in their lives. Breast cancer can be most efficiently treated if detected at an early stage. This book focuses primarily on the application of computer vision for early lesion identification in mammograms and breast-imaging volumes through computer-aided diagnostics (CAD). Colour illustrations are included in the text, and an accompanying CD-ROM contains other full-colour images.

Glaucoma is the second leading cause of blindness globally. Early detection and treatment can prevent its progression to avoid total blindness. This book discusses and reviews current approaches for detection and examines new approaches for diagnosing glaucoma using CAD system. Computer-Aided Glaucoma Diagnosis System. Chapter 1 provides a brief introduction of the disease and current methodology used to diagnose it today. Chapter 2 presents a review of the medical background of the disease, followed by a theoretical and mathematical background used in Fundus image processing. Chapter 3 is a literature review about segmentation and feature extraction. Chapter 4 describes the formulation of the proposed methodology. In Chapter 5, the results of optic disc and optic cup segmentation algorithm are presented. The feature extraction and selection method, experimental results and performance evaluations. The classifier are given. Chapter 6 presents the conclusions and discussion of the future potential for the diagnostic system. This book is intended for biomedical engineers, computer science students, ophthalmologists and radiologists looking to develop a reliable automated computer-aided diagnosis system (CAD) for detecting glaucoma and early stages of the disease. Key Features: Discusses a reliable automated computer-aided diagnosis system (CAD) for detecting glaucoma and presents an algorithm that detects optic disc and optic cup Assists ophthalmologists and researchers to test a new diagnostic method that reduces the effort and time of the doctors and cost to the patients Discusses techniques to reduce human error and minimize the misread detection rate and facilitate early diagnosis and treatment Presents algorithms to detect cup and disc color, shape features and RNFL texture features Dr. Arwa Ahmed Gasm Elseid is an assistant professor, Department of Biomedical Engineering, Sudan University of Science and Technology, Khartoum, Sudan. Dr. Alhazier Osman Mohammed Hattata is professor of Medical Imaging, College of Engineering, Sudan University of Sciences and Technology, Khartoum, Sudan.

This book is a comprehensive guide to contrast-enhanced mammography (CEM), a novel advanced mammography technique using dual-energy mammography in combination with intravenous contrast administration in order to increase the diagnostic performance of digital mammography. Readers will find helpful information on the principles of CEM and indications for the technique. Detailed attention is devoted to image interpretation, with presentation of case examples and highlighting of pitfalls and artifacts. Other topics to be addressed include the establishment of a CEM program, the comparative merits of CEM and MRI, and the roles of CEM in screening populations and monitoring of response to neoadjuvant chemotherapy. CEM became commercially available in 2011 and is increasingly being used in clinical practice owing to its superiority over full-field digital mammography. This book will be an ideal source of knowledge and guidance for all who wish to start using the technique or to learn more about it.

Proceeding of 2020 International Conference on Medical Imaging and Computer-Aided Diagnosis (MICAD 2020)

Recent Advances in Breast Imaging, Mammography, and Computer-aided Diagnosis of Breast Cancer

Advances in Computerized Analysis in Clinical and Medical Imaging

Contrast-Enhanced Mammography

Computer-aided Detection of Architectural Distortion in Prior Mammograms of Interval Cancer

Computer Aided Diagnosis for Medical Imaging

This book will describe and discuss the development of novel Computer Aided Diagnosis (CAD) software. CAD is a fast growing, global market in which innovative and well-designed products are very sought after and need support in terms of comprehensive understanding of the field, which this book will provide. This book will also describe several examples, in detail, showing the tool in use. It will provide a detailed description of the methodologies and the implementation of algorithms designed to perform the computer aided analysis of 3D medical imagery. It deals specifically with the processes of computer aided detection and characterization of abnormalities associated with disease. This book covers novel strategies and state of the art approaches for automated non-invasive systems for early prostate cancer diagnosis. Prostate cancer is the most frequently diagnosed malignancy after skin cancer and the second leading cause of cancer related male deaths in the USA after lung cancer. However, early detection of prostate cancer increases chances of patients' survival. Generally, The CAD systems analyze the prostate images through three steps: (i) prostate segmentation; (ii) Prostate description or feature extraction; and (iii) classification of the prostate state. Explores all of the latest research and developments in state-of-the-art imaging of the prostate from world class experts. Contains a comprehensive overview of 2D/3D Shape Modeling for MRI data. Presents a detailed examination of automated segmentation of the prostate in 3D imaging. Examines Computer-Aided-Diagnosis through automated techniques. There will be extensive references at the end of each chapter to enhance further study.

Advances in Computerized Analysis in Clinical and Medical Imaging book is devoted for spreading of knowledge through the publication of scholarly research, primarily in the fields of clinical & medical imaging. The types of chapters contained include those that cover the development and implementation of algorithms and strategies based on the use of geometrical, statistical, physical, functional to solve the following types of problems, using medical modalities: visualization, feature extraction, classification, pattern recognition, statistical shape analysis, computational physiology and telemedicine with medical images. This book highlights annotations for all the medical and clinical imaging researchers' a fundamental subareas of clinical and medical image analysis techniques. This book will be a good source for all the medical imagines and clinical research professionals, outstanding scientists, and educators from all around the world for network of knowledge sharing. This book will comprise high quality disseminations of new ideas, technology focus, research results and discussions on the evolution of Clinical and Medical image analysis techniques for the benefit of both scientific and industrial developments. Features: Research aspects in clinical and medical image processing Human Computer Interaction and interface in imaging diagnostics Intelligent Imaging Systems for effective analysis using machine learning algorithms Clinical and Scientific Evaluation of Imaging Studies Computer-aided disease detection and diagnosis Clinical evaluations of new technologies Mobility and assistive devices for challenged and elderly people This book serves as a reference book for researchers and doctoral students in the clinical and medical imaging domain including radiologists. Industries that manufacture imaging modalities systems and develop optical systems would be especially interested in the challenges and solutions provided in the book. Professionals and practitioners in the medical and clinical imaging may be benefited directly from authors' experiences.

Computer-Aided Detection and Diagnosis in Medical ImagingTaylor & Francis

Computer Aided Intervention and Diagnostics in Clinical and Medical Images

Collected Papers

Lung Imaging and Computer Aided Diagnosis

Classification Techniques For Medical Image Analysis and Computer Aided Diagnosis

Signal Detection Theory and ROC Analysis in Psychology and Diagnostics

Asynchronous Transfer Mode, Computer Aided Detection: Telemedicine

The aim of this book is to present the latest applications, trends, and developments of computer-aided technologies (CAx). Computer-aided technologies are the core of product lifecycle management (PLM) and human lifecycle management (HUM). This book has seven chapters, organized in two sections: "Computer-Aided Technologies in Engineering" and "Computer-Aided Technologies in Medicine." The first section treats the different aspects of PLM, including design, simulations and analysis, manufacturing, production planning, and quality assurance. In the second part of the book are presented CAx applications in medicine focused on clinical decision, diagnosis, and biosensor design. CAx plays a key role in a variety of engineering and medical applications, bringing a lot of benefits in product life cycle, extending and improving human life. This book covers virtually all aspects of image formation in medical imaging, including systems based on ionizing radiation (x-rays, gamma rays) and non-ionizing techniques (ultrasound, optical, thermal, magnetic resonance, and magnetic particle imaging) alike. In addition, it discusses the development and application of computer-aided detection and diagnosis (CAD) systems in medical imaging. Given its coverage, the book provides both a forum and valuable resource for researchers involved in image formation, experimental methods, image performance, segmentation, pattern recognition, feature extraction, classifier design, machine learning / deep learning, radionics, CAD workstation design, human-computer interaction, databases, and performance evaluation.

This book provides a comprehensive overview of the state-of-the-art computational intelligence research and technologies in computer-assisted radiation therapy based on image engineering. It also traces major technical advancements and research findings in the field of image-based computer-assisted radiation therapy. In high-precision radiation therapies, novel approaches in image engineering including computer graphics, image processing, pattern recognition, and computational anatomy play important roles in improving the accuracy of radiation therapy and assisting decision making by radiation oncology professionals, such as radiation oncologists, radiation technologists, and medical physicists, in each phase of radiation therapy. All the topics presented in this book broaden understanding of the modern medical technologies and systems for image-based computer-assisted radiation therapy. Therefore this volume will greatly benefit not only radiation oncologists and radiologists but also radiation technologists, professors in medical physics or engineering, and engineers involved in the development of products to utilize this advanced therapy.

The Internet of Things (IoT) has made revolutionary advances in the utility grid as we know it. Among these advances, intelligent medical services are gaining much interest. The use of Artificial Intelligence (AI) is increasing day after day in fighting one of the most significant viruses, COVID-19. The purpose of this book is to present the detailed recent exploration of AI and IoT in the COVID-19 pandemic and similar applications. The integrated AI and IoT paradigm is widely used in most medical applications, as well as in sectors that deal with transacting data every day. This book can be used by computer science undergraduate and postgraduate students; researchers and practitioners; and city administrators, policy makers, and government regulators. It presents a smart and up-to-date model for COVID-19 and similar applications. Novel architectural and medical use cases in the smart city project are the core aspects of this book. The wide variety of topics it presents offers readers multiple perspectives on a variety of disciplines. Prof. Dr. Fadi Al-Turjman received his PhD in computer science from Queen's University, Kingston, Ontario, Canada, in 2011. He is a full professor and research center director at Near East University, Nicosia, Cyprus.

Computer-aided Cancer Detection and Diagnosis

Image Analysis

Recent Trends in Computer-aided Diagnostic Systems for Skin Diseases

Pattern Recognition Applied to the Computer-aided Detection and Diagnosis of Breast Cancer from Dynamic Contrast-enhanced Magnetic Resonance Breast Images

Computer Aided Detection in Mammography

Computer-Aided Glaucoma Diagnosis System

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—fail 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 classifying 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 data, the book examines: Lung segmentation 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.

This book is a compendium of the ICMIA 2018 proceedings, which provides an ideal reference for all medical imaging researchers and professionals to explore innovative methods and analyses on imaging technologies for better prospective patient care. This work serves as an exclusive source for new computer assisted clinical and medical developments in imaging diagnosis, intervention and analysis. It includes articles on computer assisted medical scanning techniques, computer-aided diagnosis, robotic surgery and imaging, imaging genomics, clinically-oriented imaging physics and informatics, augmented-reality medical visualization, imaging modalities, computerized radiology, oncology, and surgery. Moreover, information on non-medical imaging that has medical applications such as multi-photon microscopy and confocal, photoacoustic imaging, optical microendoscope, infra-red radiation, and other imaging modalities is also represented.

The goal of this research is to improve the breast cancer screening process based on magnetic resonance imaging (MRI). In a typical MRI breast examination, a radiologist is responsible for visually examining the MR images acquired during the examination and identifying suspect tissues for biopsy. It is known that if multiple radiologists independently analyze the same examinations and we biopsy any lesion that any of our radiologists flagged as suspicious then the overall screening process becomes more sensitive but less specific. Unfortunately cost factors prohibit the use of multiple radiologists for the screening of every breast MR examination. It is thought that instead of having a second expert human radiologist to examine each set of images, that the act of second reading of the examination can be performed by a computer-aided detection and diagnosis system. The research presented in this thesis is focused on the development of a computer-aided detection and diagnosis system for breast cancer screening from dynamic contrast-enhanced magnetic resonance imaging examinations. This thesis presents new computational techniques in supervised learning, unsupervised learning and classifier visualization. The techniques have been applied to breast MR lesion data and have been shown to outperform existing methods yielding a computer aided detection and diagnosis system with a sensitivity of 89% and a specificity of 70%.

In modern healthcare, various medical modalities play an important role in improving the diagnostic performance in healthcare systems for various applications, such as prosthesis design, surgical implant design, diagnosis and prognosis, and detection of abnormalities in the treatment of various diseases. Analysis of Medical Modalities for Improved Diagnosis in Modern Healthcare discusses the uses of analysis, modeling, and manipulation of modalities, such as EEG, ECG, EMG, PGC, EEG, MRI, and fMRI, for an automatic identification, classification, and diagnosis of different types of disorders and physiological states. The analysis and applications for post-processing and diagnosis are much-needed topics for researchers and faculty members all across the world in the field of automated and efficient diagnosis using medical modalities. To meet this need, this book emphasizes real-time challenges in medical modalities for a variety of applications for analysis, classification, identification, and diagnostic processes of healthcare systems. Each chapter starts with the introduction, need and motivation of the medical modality, and a number of applications for the identification and improvement of healthcare systems. The chapters can be read independently or consecutively by research scholars, graduate students, faculty members, and practicing scientists who wish to explore various disciplines of healthcare systems, such as computer sciences, medical sciences, and biomedical engineering. This book aims to improve the direction of future research and strengthen research through analysis of behavior, concepts, principles, and case studies. This book also aims to overcome the gap between usage of medical modalities and healthcare systems. Several novel applications of medical modalities have been unlocked in recent years, therefore new applications, challenges, and solutions for healthcare systems are the focus of this book.

Digital Mammography

ICT Innovations 2014

An Engineering and Clinical Perspective

20th Scandinavian Conference, SCIA 2017, Tromsø, Norway, June 12-14, 2017, Proceedings, Part I

Computer-Aided Diagnosis and Therapy

Early detection of breast cancer with screening mammography is still the best method we have in saving countless women's lives and decreasing the harms of overtreatment. This textbook encompasses relevant topics in daily patient care with breast imaging to technical innovations for improving breast cancer detection and treatment.

"This book is an attempt to collate novel techniques and methodologies in the domain of content-based image classification and deep learning/machine learning techniques to design efficient computer aided diagnosis architecture. It is aimed to highlight new challenges and probable solutions"--

This book covers virtually all aspects of image formation in medical imaging, including systems based on ionizing radiation (x-rays, gamma rays) and non-ionizing techniques (ultrasound, optical, thermal, magnetic resonance, and magnetic particle imaging) alike. In addition, it discusses the development and application of computer-aided detection and diagnosis (CAD) systems in medical imaging. Given its coverage, the book provides both a forum and valuable resource for researchers involved in image formation, experimental methods, image performance, segmentation, pattern recognition, feature extraction, classifier design, machine learning / deep learning, radionics, CAD workstation design, human-computer interaction, databases, and performance evaluation. Data is a common ground, a starting point for each ICT system. Data needs processing, use of different technologies and state-of-the-art methods in order to obtain new knowledge, to develop new useful applications that not only ease, but also increase the quality of life. These applications use the exploration of Big Data, High throughput data, Data Warehouse, Data Mining, Bioinformatics, Robotics, with data coming from social media, sensors, scientific applications, surveillance, video and image archives, internet texts and documents, internet search indexing, medical records, business transactions, web logs, etc. Information and communication technologies have become the asset in everyday life enabling increased level of communication, processing and information exchange. This book offers a collection of selected papers presented at the Sixth International Conference on ICT Innovations held in September 2014, in Ohrid, Macedonia, with main topic: World of data. The conference gathered academics, professionals and practitioners in developing solutions and systems in the industrial and business arena, especially innovative commercial implementations, novel applications of technology, and experience in applying recent ICT research advances to practical solutions.

World of Data

Physics and Technology

Computer-aided Diagnosis in Medical Imaging

A Systematic Survey of Computer-Aided Diagnosis in Medicine: Past and Present Developments

Machine Learning in Computer-Aided Diagnosis: Medical Imaging Intelligence and Analysis

Design, Implementation and Application

With the development of processing medical imaging modalities and their applications, the need for computers and computing in image generation, processing, visualization, archival, transmission, modeling, and analysis has grown substantially. Computers are being integrated into almost every medical imaging system. Medical Image Analysis and Informatics demonstrates how quantitative analysis becomes possible by the application of computational procedures to medical images. Furthermore, it shows how quantitative and objective analysis facilitated by medical image informatics, CBIR, and CAD could lead to improved diagnosis by physicians. Whereas CAD has become a part of the clinical workflow in the detection of breast cancer with mammograms, it is not yet established in other applications. CBIR is an alternative and complementary approach for image retrieval based on measures derived from images, which could also facilitate CAD. This book shows how digital image processing techniques can assist in quantitative analysis of medical images, how pattern recognition and classification techniques can facilitate CAD, and how CAD systems can assist in achieving efficient diagnosis, in designing optimal treatment protocols, in analyzing the effects of or response to treatment, and in clinical management of various conditions. The book affirms that medical imaging, medical image analysis, medical image informatics, CBIR, and CAD are proven as well as essential techniques for health care.

Disruptive Trends in Computer Aided Diagnosis collates novel techniques and methodologies in the domain of content based image classification and deep learning/machine learning techniques to design efficient computer aided diagnosis architecture. It is aimed to highlight new challenges and probable solutions in the domain of content based image classification and deep learning/machine learning techniques to design efficient computer aided diagnosis architecture. The book is divided into four sections. The first section presents CAD technologies in breast imaging, which is the most advanced area of CAD application. The second section discusses CAD technologies in chest and abdominal imaging. The third section explores emerging CAD technologies in a wide range of imaging modalities designed to address a variety of diseases. The final section describes the current use of CAD systems in clinical practice as well as how CAD will play an important role in quantitative image biomarkers and imaging genomics research. This book brings together existing and emerging CAD approaches at a level understandable to students, CAD system developers, basic scientists, and physician scientists. Newcomers to CAD research will learn about fundamental aspects in the process of CAD system development. Developers of CAD systems will gain insight on designing new or improved CAD systems. Experienced researchers will get up-to-date information on the latest CAD technologies.

The three-volume set LNCS 9349, 9350, and 9351 constitutes the refereed proceedings of the 18th International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2015, held in Munich, Germany, in October 2015. Based on rigorous peer reviews, the program committee carefully selected 263 revised papers from 810 submissions for presentation in three volumes. The papers have been organized in the following topical sections: quantitative image analysis I: segmentation and measurement; computer-aided diagnosis; machine learning; computer-aided diagnosis: automation; quantitative image analysis II: classification, detection, features, and morphology; advanced MRI: diffusion, fMRI, DCE; quantitative image analysis III: motion, deformation, development and degeneration; quantitative image analysis IV: microscopy, fluorescence and histological imagery; registration: method and advanced applications; reconstruction, image formation, and advanced acquisition – computational imaging; modelling and simulation for diagnosis and interventional planning; computer-assisted and image-guided interventions.

Theory, Implementation, and Analysis

Medical Image Computing and Computer-Assisted Intervention -- MICCAI 2015

Developing Novel Computer-aided Detection and Diagnosis Systems of Medical Images

Computer-Aided Detection and Diagnosis in Medical Imaging

Handbook of X-ray Imaging

18th International Conference, Munich, Germany, October 5-9, 2015, Proceedings, Part II

Containing chapter contributions from over 130 experts, this unique publication is the first handbook dedicated to the physics and technology of X-ray imaging, offering extensive coverage of the field. This highly comprehensive work is edited by one of the world's leading experts in X-ray imaging physics and technology and has been created with guidance from a Scientific Board containing respected and renowned scientists from around the world. The book's scope includes 2D and 3D X-ray imaging techniques from soft-X-ray to megavoltage energies, including computed tomography, fluoroscopy, dental imaging and small animal imaging, with several chapters dedicated to breast imaging techniques. 2D and 3D industrial imaging is incorporated, including imaging of artworks. Specific attention is dedicated to techniques of phase contrast X-ray imaging. The approach undertaken is one that illustrates the theory as well as the techniques and the devices routinely used in the various fields. Computational aspects are fully covered, including 3D reconstruction algorithms, hard/software phantoms, and computer-aided diagnosis. Theories of image quality are fully illustrated. Historical, radioprotection, radiation dosimetry, quality assurance and educational aspects are also covered. This handbook will be suitable for a very broad audience, including graduate students in medical physics and biomedical engineering; medical physics residents; radiographers; physicists and engineers in the field of imaging and non-destructive industrial testing using X-rays; and scientists interested in understanding and using X-ray imaging techniques. The handbook's editor, Dr. Paolo Russo, has over 30 years' experience in the academic teaching of medical physics and X-ray imaging research. He has authored several book chapters in the field of X-ray imaging, is Editor-in-Chief of an international scientific journal in medical physics, and has responsibilities in the publication committees of international scientific organizations in medical physics. Features: Comprehensive coverage of the use of X-rays both in medical radiology and industrial testing The first handbook published to be dedicated to the physics and technology of X-rays Handbook edited by world authority, with contributions from experts in each field

Accurate imaging of cancerous tissue is a critical step in the fight to lower cancer mortality rates, and computer-aided detection and diagnosis (CAD) technologies play a key role. Over the last three decades, the field of diagnostic cancer imaging has witnessed a remarkable evolution that has affected virtually every aspect of research and clinical management of cancer. This book discusses recent high-quality research in key technologies used in CAD systems; the 11 chapters cover different types of cancers (including skin, breast, prostate, and colon cancer) and different scientific fields (such as biomedicine, imaging, image processing, pattern recognition, and system analysis) to further the major goals of current cancer imaging: • Provide more reliable disease characterization through the synthesis of anatomic, functional, and molecular imaging information; • Refine and optimize imaging capabilities in oncology; • Establish new imaging modalities and findings, and discover the potential use of these techniques; • Find more individualized assessment of tumor biology, personalized treatments, and response to treatment; • Develop image-processing-based cancer control systems; and • Explore imaging capabilities and strategies to streamline cancer drug development.

Classification Techniques for Medical Image Analysis and Computer Aided Diagnosis covers the most current advances on how to apply classification techniques to a wide variety of clinical applications that are appropriate for researchers and biomedical engineers in the areas of machine learning, deep learning, data analysis, data management and computer-aided diagnosis (CAD) systems design. The book covers several complex image classification problems using pattern recognition methods, including Artificial Neural Networks (ANN), Support Vector Machines (SVM), Bayesian Networks (BN) and deep learning. Further, numerous data mining techniques are discussed, as they have proven to be good classifiers for medical images. Examines the methodology of classification of medical images that covers the taxonomy of both supervised and unsupervised models, algorithms, applications and challenges Discusses recent advances in Artificial Neural Networks, machine learning, and deep learning in clinical applications Introduces several techniques for medical image processing and analysis for CAD systems design

Hardbound. Over the last decade or so, many investigators have carried out basic studies and clinical applications toward the development of modern computerized schemes for detection and characterization of lesions in radiologic images, based on computer vision and artificial intelligence. These methods and techniques are generally called computer-aided diagnosis (CAD) schemes. The development of CAD has now reached a new phase, since the first commercial unit of detection of breast lesion in mammograms was approved in June 1998 by the FDA for marketing and sale for clinical use. This book, Computer-Aided Diagnosis in Medical Imaging, presents papers from the First International Workshop on Computer-Aided Diagnosis held on September, 1998 at the University of Chicago Downtown Center. The meeting provided a forum for leading researchers and practitioners in this rapidly expanding field, encompassing automated image analysis, quantitation of fm

Prostate Cancer Imaging

Computer-aided Technologies

Applications in Engineering and Medicine

Proceedings of 2021 International Conference on Medical Imaging and Computer-Aided Diagnosis (MICAD 2021)

Disruptive Trends in Computer Aided Diagnosis

AI-Powered IoT for COVID-19

PhD.

Recent Trends in Computer-aided Diagnostic Systems for Skin Diseases: Theory, Implementation, and Analysis provides comprehensive coverage on the development of computer-aided diagnostic (CAD) systems employing image processing and machine learning tools for improved, uniform evaluation and diagnosis (avoiding subjective judgment of skin diseases). The methods and tools are described in a general way that they can be applied not only to skin diseases but also for a wide range of analogous problems in the domain of biomedical systems. Moreover, quantification of clinically relevant information that can associate the findings of physicians/experts is the most challenging task of any CAD system. This book gives all the details in a step-by-step form that the readers can develop each of the modules like preprocessing, feature extraction/learning, disease classification, as well as an entire expert diagnosis system themselves for their own applications. Demonstrates extensive calculations for illustrating the theoretical analysis of advanced image processing and machine learning techniques Provides a comprehensive coverage on the development of various signal processing tools for the extraction of statistical and clinically correlated features from skin lesion images Describes image processing and machine learning techniques for improved uniform evaluation and diagnosis of skin disorders

Digital Radiography has been r mly established in diagnostic radiology during the last decade. Because of the special requirements of high contrast and spatial resolution needed for roentgen mammography, it took more time to develop digital m-mography as a routine radiological tool. Recent technological progress in detector and screen design as well as increased ex- rience with computer applications for image processing have now enabled Digital Mammography to become a mature modality that opens new perspectives for the diag- sis of breast diseases. The editors of this timely new volume Prof. Dr. U. Bick and Dr. F. Diekmann, both well-known international leaders in breast imaging, have for many years been very active in the frontiers of theoretical and translational clinical research, needed to bring digital mammography ? nally into the sphere of daily clinical radiology. I am very much indebted to the editors as well as to the other internationally re- nized experts in the ? eld for their outstanding state of the art contributions to this v- ume. It is indeed an excellent handbook that covers in depth all aspects of Digital Mammography and thus further enriches our book series Medical Radiology. The highly informative text as well as the numerous well-chosen superb illustrations will enable cert? ed radiologists as well as radiologists in training to deepen their knowledge in modern breast imaging.

A fiber-optic network derived by a set of ATM (asynchronous transfer mode) switches in association with CAD (computer aided diagnosis/detection) algorithms has been set up as the first prototype of on-line, real-time cancer detection/diagnostic system. Expanding diagnostics and treatment beyond the local level will bring better health care to a wider range of people at a reduced cost. This work describes the Asynchronous Transfer Mode (ATM) Teleradiology Network (ATMTN) and the high-speed fiber backbone architecture as a new technology that offers real-time, on-line, more accurate screening, detection and diagnosis of breast cancer with less need for invasive treatment. ATMTN is a fully automatic, robust and high-speed network integrated with DICOM standards, and IP protocols and associated with Computer Assisted Detection/Diagnostic (CAD) methods for digital mammography.

Proceedings of the First International Workshop on Computer-Aided Diagnosis, Chicago, U.S.A., 20-23 September 1998

Medical Image Analysis and Informatics

Applying Novel Machine Learning Technology to Optimize Computer-aided Detection and Diagnosis of Medical Images

Medical Imaging and Computer-Aided Diagnosis

Proceedings of 2022 International Conference on Medical Imaging and Computer-Aided Diagnosis (MICAD 2022)

Medical Imaging Intelligence and Analysis

Signal detection theory—as developed in electrical engineering and based on statistical decision theory—was first applied to human sensory discrimination 40 years ago. The theoretical intent was to provide a valid model of the discrimination process; the methodological intent was to provide reliable measures of discrimination acuity in specific sensory tasks. An analytic method of detection theory, called the relative operating characteristic (ROC), can isolate the effect of the placement of the decision criterion, which may be variable and idiosyncratic, so that a pure measure of intrinsic discrimination acuity is obtained. For the past 20 years, ROC analysis has also been used to measure the discrimination acuity or inherent accuracy of a broad range of practical diagnostic systems. It was widely adopted by methodologists in the field of information retrieval, is increasingly used in weather forecasting, and is the generally preferred method in clinical medicine, primarily in radiology. This book attends to both themes, ROC analysis in the psychology laboratory and in practical diagnostic settings, and to their essential unity. The focus of this book is on detection and recognition as fundamental tasks that underlie most complex behaviors. As defined here, they lead to distinguishable stimulus categories, which may be perceptual or cognitive categories in the psychology laboratory, or different states of the world in practical diagnostic tasks. This book on signal detection theory in psychology was written by one of the developers of the theory who co-authored with D.M. Green the classic work published in this area in 1967 (reprinted in 1974 and 1988). This volume reviews the history of the theory in engineering, statistics, and psychology, leading to the separate measurement of the two independent factors in all discrimination tasks, discrimination acuity and decision criterion. It extends the previous book to show how in several areas of psychology—in vigilance and memory—what had been thought to be discrimination effects were, in reality, effects of a changing criterion. The book shows that data plotted in terms of the relative operating characteristic have essentially the same form across the wide range of discrimination tasks in psychology. It develops the implications of this ROC form for measures of discrimination acuity, pointing up the valid ones and identifying several common, but invalid, ones. The area under the binomial ROC is seen to be supported by the data; the popular measures d' and percent correct are not. An appendix describes the best, current programs for fitting ROCs and estimating their parameters, indices, and standard errors. The application of ROC analysis to diagnostic tasks is also described. Diagnostic accuracy in a wide range of tasks can be expressed in terms of the ROC area index. Choosing the appropriate decision criterion for a given diagnostic setting—rather than considering some single criterion to be natural and fixed—has a major impact on the efficacy of a diagnostic process or system. Illustrated here by separate chapters are diagnostic systems in radiology, information retrieval, aptitude testing, survey research, and environments in which imminent dangerous conditions must be detected. Data from weather forecasting, blood testing, and polygraph lie detection are also reported. One of these chapters describes a general approach to enhancing the accuracy of diagnostic systems.

The two-volume set LNCS 10269 and 10270 constitutes the refereed proceedings of the 20th Scandinavian Conference on Image Analysis, SCIA 2017, held in Tromsø, Norway, in June 2017. The 87 revised papers presented were carefully reviewed and selected from 133 submissions. The contributions are structured in topical sections on history of SCIA; motion analysis and 3D vision; pattern detection and recognition; machine learning; image processing and applications; feature extraction and segmentation; remote sensing; medical and biomedical image analysis; faces, gestures and multispectral analysis. Computer-aided diagnosis (CAD) in medicine is the result of a large amount of effort expended in the interface of medicine and computer science. As some CAD systems in medicine try to emulate the diagnostic decision-making process of medical experts, they can be considered as expert systems in medicine.

"This book provides a comprehensive overview of machine learning research and technology in medical decision-making based on medical images"—Provided by publisher.

Breast Imaging

Image-Based Computer-Assisted Radiation Therapy

Recent Advances

Analysis of Medical Modalities for Improved Diagnosis in Modern Healthcare