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Medical Image Computing and Computer-Assisted Intervention - MICCAI 2008
Application of Deep Learning Methods in Healthcare and Medical Science
Landmarking and Segmentation of 3D CT Images
Registration and Recognition in Images and Videos
Intelligent Computing Theories and Application
Medical Imaging and Health Informatics
Medical Image Recognition, Segmentation and Parsing
Machine Learning in Medical Imaging
Multi Modality State-of-the-Art Medical Image Segmentation and Registration Methodologies
Advanced Concepts for Intelligent Vision Systems
7th Asian-Pacific Conference on Medical and Biological Engineering

HATFIELD SUTTON

Image Processing in Radiation Therapy Springer
The three-volume set LNCS 9900, 9901, and 9902 constitutes the refereed proceedings of the 19th International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2016, held in Athens, Greece, in October 2016. Based on rigorous peer reviews, the program committee carefully selected 228 revised regular papers from 756 submissions for presentation in three volumes. The papers have been organized in the following topical sections: Part I: brain analysis, brain analysis - connectivity; brain analysis - cortical morphology; Alzheimer disease; surgical guidance and tracking; computer aided interventions; ultrasound image analysis; cancer image analysis; Part II: machine learning and feature selection; deep learning in medical imaging; applications of machine learning; segmentation; cell image analysis; Part III: registration and deformation estimation; shape modeling; cardiac and vascular image analysis; image reconstruction; and MR image analysis.

Landmarking and Segmentation of 3D CT Images Springer
Segmentation and landmarking of computed tomographic (CT) images of pediatric patients are important and useful in computer-aided diagnosis (CAD), treatment planning, and objective analysis of normal as well as pathological regions. Identification and segmentation of organs and tissues in the presence of tumors are difficult. Automatic segmentation of the primary tumor mass in neuroblastoma could facilitate reproducible and objective analysis of the tumor's tissue composition, shape, and size. However, due to the heterogeneous tissue composition of the neuroblastic tumor, ranging from low-attenuation necrosis to high-attenuation calcification, segmentation of the tumor mass is a challenging problem. In this context, methods are described in this book for identification and segmentation of several abdominal and thoracic landmarks to assist in the segmentation of neuroblastic tumors in pediatric CT images. Methods to identify and segment automatically the peripheral artifacts and tissues, the rib structure, the vertebral column, the spinal canal, the diaphragm, and the pelvic surface are described.

Techniques are also presented to evaluate quantitatively the results of segmentation of the vertebral column, the spinal canal, the diaphragm, and the pelvic girdle by comparing with the results of independent manual segmentation performed by a radiologist. The use of the landmarks and removal of several tissues and organs are shown to assist in limiting the scope of the tumor segmentation process to the abdomen, to lead to the reduction of the false-positive error, and to improve the result of segmentation of neuroblastic tumors. Table of Contents: Introduction to Medical Image Analysis / Image Segmentation / Experimental Design and Database / Ribs, Vertebral Column, and Spinal Canal / Delineation of the Diaphragm / Delineation of the Pelvic Girdle / Application of Landmarking / Concluding Remarks

Registration Methods for Pulmonary Image Analysis Springer

This book provides a comprehensive introduction to current state-of-the-art auto-segmentation approaches used in radiation oncology for auto-delineation of organs-of-risk for thoracic radiation treatment planning. Containing the latest, cutting edge technologies and treatments, it explores deep-learning methods, multi-atlas-based methods, and model-based methods that are currently being developed for clinical radiation oncology applications. Each chapter focuses on a specific aspect of algorithm choices and discusses the impact of the different algorithm modules to the algorithm performance as well as the implementation issues for clinical use (including data curation challenges and auto-contour evaluations). This book is an ideal guide for radiation oncology centers looking to learn more about potential auto-segmentation tools for their clinic in addition to medical physicists commissioning auto-segmentation for clinical use. Features: Up-to-date with the latest technologies in the field Edited by leading authorities in the area, with chapter contributions from subject area specialists All approaches presented in this book are validated using a standard benchmark dataset established by the Thoracic Auto-segmentation Challenge held as an event of the 2017 Annual Meeting of American Association of Physicists in Medicine

Multi Modality State-of-the-Art Medical Image Segmentation and Registration Methodologies IOS Press

The book is designed for end users in the field of digital imaging, who wish to update their skills and understanding with the latest techniques in image analysis. The book emphasizes the conceptual framework of image analysis and the effective use of image processing tools. It uses applications in a variety of fields to demonstrate and consolidate both specific and general concepts, and to build intuition, insight and understanding. Although the chapters are essentially self-contained they reference other chapters to form an integrated whole. Each chapter employs a pedagogical approach to ensure conceptual learning before introducing specific techniques and “tricks of the trade”. The book concentrates on a number of current research applications, and will present a detailed approach to each while emphasizing the applicability of techniques to other problems. The field of topics is wide, ranging from compressive (non-uniform) sampling in MRI, through automated retinal vessel analysis to 3-D ultrasound imaging and more. The book is amply illustrated with figures and applicable medical images. The reader will learn the techniques which experts in the field are currently employing and testing to solve particular research problems, and how they may be applied to other problems.

Deep Learning and Data Labeling for Medical Applications Academic Press

This book provides a structured and analytical guide to the use of artificial intelligence in medicine. Covering all areas within medicine, the chapters give a systemic review of the history, scientific foundations, present advances, potential trends, and future challenges of artificial intelligence within a healthcare setting. Artificial Intelligence in Medicine aims to give readers the required knowledge to apply artificial intelligence to clinical practice. The book is relevant to medical students, specialist doctors, and researchers whose work will be affected by artificial intelligence.

Medical Image Computing and Computer-Assisted Intervention – MICCAI 2016 Springer Science & Business Media

Pulmonary embolism (PE) is an extremely common and highly lethal condition that is a leading cause of death in all age groups. Over the past 10 years, computed tomography (CT) scanners have gained acceptance as a minimally invasive method for diagnosing PE. In this book, a framework for computer-aided diagnosis of PE in contrast-enhanced CT images is presented. It consists of a combination of a method for segmenting the pulmonary arteries (PA), emboli detection methods as well as a scheme for evaluating their performances. The segmentation of the PA serves one of the clot detection methods, and is carried out through a region growing method that makes use of a priori knowledge of vessel topology. Two different approaches for clot detection are proposed: the first one performs clot detection by analyzing the concavities in the segmentation of the pulmonary arterial tree. It works in a semi-automatic way and it enables the detection of thrombi in the larger sections of the PA. The second method does not make use of PA segmentation and is thus fully automatic, enabling detection of clots farther in the vessels. The combination of these methods provides a robust detection technique that can be used as a safeguard by radiologists, or even as preliminary computer-aided diagnosis (CAD) tool. The evaluation of the method is also discussed, and a scheme for measuring its performance is proposed, including a practical approach to making reference detection data, or ground truths, by radiologists.

Medical Imaging and Augmented Reality Springer Science & Business Media

Title Page -- Contents -- Some Requirements for and Experience with Covira algorithms for Registration and Segmentation -- Multi-modality image registration within COVIRA -- Using geometrical features to match CT and MR brain images -- Anatomical Surfaces Based 3D/3D and 3D/2D Registration for Computer Assisted Medical Interventions -- Segmentation and Fusion of Multimodality and Multi-Subjects Data for the Preparation of Neurosurgical Procedures -- 3D MULTIMODAL IMAGING IN IMAGE GUIDED INTERVENTIONS -- Interactive Image Segmentation in COVIRA -- Interactive Segmentation for Target Outline -- Medical Image Segmentation Using Active Shape Models -- Probabilistic hyperstack segmentation of MR brain data -- Towards Automatic Segmentation of Two-Dimensional Brain Tomograms -- Blood Vessel and Feature Extraction Based on Direction Fields -- Structural description and combined 3-D display for superior analysis of cerebral vascularity from MRA -- Author Index -- Glossary -- Colour Supplement

Deep Learning-based Computed Tomography Image Processing Springer

This book constitutes the refereed proceedings of two workshops held at the 19th International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2016, in Athens, Greece, in October 2016: the First Workshop on Large-Scale Annotation of Biomedical Data and Expert Label Synthesis, LABELS 2016, and the Second

International Workshop on Deep Learning in Medical Image Analysis, DLMIA 2016. The 28 revised regular papers presented in this book were carefully reviewed and selected from a total of 52 submissions. The 7 papers selected for LABELS deal with topics from the following fields: crowd-sourcing methods; active learning; transfer learning; semi-supervised learning; and modeling of label uncertainty.The 21 papers selected for DLMIA span a wide range of topics such as image description; medical imaging-based diagnosis; medical signal-based diagnosis; medical image reconstruction and model selection using deep learning techniques; meta-heuristic techniques for fine-tuning parameter in deep learning-based architectures; and applications based on deep learning techniques.

Computer-aided Diagnosis of Pulmonary Embolism in Opacified CT Images CRC Press

This book presents an Introduction and 11 independent chapters, which are devoted to various new approaches of intelligent image processing and analysis. The book also presents new methods, algorithms and applied systems for intelligent image processing, on the following basic topics: Methods for Hierarchical Image Decomposition; Intelligent Digital Signal Processing and Feature Extraction; Data Clustering and Visualization via Echo State Networks; Clustering of Natural Images in Automatic Image Annotation Systems; Control System for Remote Sensing Image Processing; Tissue Segmentation of MR Brain Images Sequence; Kidney Cysts Segmentation in CT Images; Audio Visual Attention Models in Mobile Robots Navigation; Local Adaptive Image Processing; Learning Techniques for Intelligent Access Control; Resolution Improvement in Acoustic Maps. Each chapter is self-contained with its own references. Some of the chapters are devoted to the theoretical aspects while the others are presenting the practical aspects and the analysis of the modeling of the developed algorithms in different application areas.

Information Processing in Medical Imaging Springer

Computer vision is the science and technology of making machines that see. It is concerned with the theory, design and implementation of algorithms that can automatically process visual data to recognize objects, track and recover their shape and spatial layout. The International Computer Vision Summer School - ICVSS was established in 2007 to provide both an objective and clear overview and an in-depth analysis of the state-of-the-art research in Computer Vision. The courses are delivered by world renowned experts in the field, from both academia and industry and cover both theoretical and practical aspects of real Computer Vision problems. The school is organized every year by University of Cambridge (Computer Vision and Robotics Group) and University of Catania (Image Processing Lab). Different topics are covered each year. This edited volume contains a selection of articles covering some of the talks and tutorials held during the last editions of the school. The chapters provide an in-depth overview of challenging areas with key references to the existing literature.

Segmentation, Classification, and Registration of Multi-modality Medical Imaging Data Morgan & Claypool Publishers

With the advances in image guided surgery for cancer treatment, the role of image segmentation and registration has become very critical. The central engine of any image guided surgery product is its ability to quantify the organ or segment the organ whether it is a magnetic resonance imaging (MRI) and computed tomography (CT), X-ray, PET, SPECT, Ultrasound, and Molecular imaging modality. Sophisticated segmentation algorithms can help the physicians delineate better the anatomical structures present in the input images, enhance the accuracy of medical diagnosis and facilitate the best treatment planning system designs. The focus of this book in towards the state of the art techniques in the area of image segmentation and registration.

Medical Image Computing and Computer-Assisted Intervention - Miccai 2012 Springer

The 5th International Workshop on Medical Imaging and Augmented Reality, MIAR 2010, was held at the China National Convention Center (CNCC), B- jing, China on September 19–20, 2010. MIAR has remained a truly international meeting, bringing together - searchers from all ?elds related to medical image analysis, visualization and targeted intervention.In recent years,technical advances in therapeutic delivery andagrowingdemandforpatient-speci?ctreatmenthaveacceleratedtheclinical applications of MIAR-related techniques. Imaging plays an increasingly imp- tant role in targeted therapy, with interventions such as drug or gene therapy relying on more accurate delivery tailored to individual patients. Rapid progress in surgical methodologies, such as those with robot assistance, demands p- cise guidance from both preoperative and intraoperative imaging. The volume of data available from existing and emerging imaging modalities leads to a - sire for more automated analysis for diagnosis, segmentation and registration. Research in this rapidly developing area is highly multi-disciplinary, integrating research in life sciences, physical sciences, engineering, and medicine.

Medical Image Processing John Wiley & Sons

Stereo and temporal eye registration by mutual information maximization -- Quantification of brain aneurysm dimensions from CTA for surgical planning of coiling interventions -- Inverse consistent image registration -- A computer-aided design system for segmentation of volumetric images -- Inter-subject non-rigid registration: an overview with classification and the Romeo algorithm -- Elastic registration for biomedical applications -- Quo vadis, atlas-based segmentation -- Elastic registration for biomedical applications --

2019 International Conference on Systems, Signals and Image Processing (IWSSIP) Springer Nature

This book constitutes the refereed proceedings of the 19th International Conference on Advanced Concepts for Intelligent Vision Systems, ACIVS 2018, held in Poitiers, France, in September 2018. The 52 full papers presented in this volume were carefully reviewed and selected from 91 submissions. They were organized in topical sections named: video analysis; segmentation and classification; remote sending; biometrics; deep learning; coding and compression; and image restauration and reconstruction.

EVALUATING SEVERITY OF WHITE MATTER CHANGES FROM CT WITH CONVOLUTIONAL NEURAL NETWORK John Wiley & Sons

Computed Tomography (CT) is one of the most common modalities of medical imaging. CT scan has become a useful screening tool for body composition analysis and spinal conditions. Body composition is an emerging biomarker for cancer diagnosis and treatment. The assessment of the body composition profile of cancer patients during treatment and survivorship revealed the critical role of skeletal muscle mass in drug toxicity, hospital stay, infection rate and survival outcome. In this thesis, we propose a set of automatic CT image analysis frameworks for skeletal muscle mass and adipose tissue segmentation. This pipeline includes middle cross-sectional slice classification at the third lumbar vertebra in a CT-scan volume and muscle and

adipose tissue segmentation at the third and fourth lumbar vertebrae levels. A multi-class segmentation network is trained to generate the segmentation map of skeletal muscle, subcutaneous adipose tissue, visceral adipose tissue and intramuscular adipose tissue in the third lumbar vertebrae level CT images. The model is designed to translate the spatial resolution from the feature maps of the encoder section to the decoder layers and learn the data representations at various receptive fields. To develop a computer-aided detection technique for vertebral column metastases and other spine related diseases, an automatic vertebral column segmentation and identification method is essential. In the second part of this thesis, a deep-learning based method for accurate pixel-level labelling of vertebrae on CT images is proposed. This algorithm includes 3D vertebral column segmentation and localization on CT-scan volumes. A two step semantic segmentation model utilizing a pixel-link map is introduced to tackle the vertebrae identification task. The proposed methods leverage deep learning algorithms to learn the representation of the data and map the input images to the desired output. Several datasets of CT images from various clinical institutions were obtained to train and evaluate the proposed models. These methods, accelerate the CT image analysis process and provide the information required for physicians to make a diagnosis.

Artificial Intelligence in Medicine Springer

This book presents cutting-edge research and applications of deep learning in a broad range of medical imaging scenarios, such as computer-aided diagnosis, image segmentation, tissue recognition and classification, and other areas of medical and healthcare problems. Each of its chapters covers a topic in depth, ranging from medical image synthesis and techniques for muskuloskeletal analysis to diagnostic tools for breast lesions on digital mammograms and glaucoma on retinal fundus images. It also provides an overview of deep learning in medical image analysis and highlights issues and challenges encountered by researchers and clinicians, surveying and discussing practical approaches in general and in the context of specific problems. Academics, clinical and industry researchers, as well as young researchers and graduate students in medical imaging, computer-aided-diagnosis, biomedical engineering and computer vision will find this book a great reference and very useful learning resource.

2020 IEEE Pune Section International Conference (PuneCon) CRC Press

Images from CT, MRI, PET, and other medical instrumentation have become central to the radiotherapy process in the past two decades, thus requiring medical physicists, clinicians, dosimetrists, radiation therapists, and trainees to integrate and segment these images efficiently and accurately in a clinical environment. Image Processing in Radiation Therapy presents an up-to-date, detailed treatment of techniques and algorithms for the registration, segmentation, reconstruction, and evaluation of imaging data. It describes how these tools are used in radiation planning, treatment delivery, and outcomes assessment. The book spans deformable registration, segmentation, and image reconstruction and shows how to incorporate these practices in radiation therapy. The first section explores image processing in adaptive radiotherapy, online monitoring and tracking, dose accumulation, and accuracy assessment. The second section describes the mathematical approach to deformable registration. The book presents similarity metrics used for registration techniques, discussing their effectiveness and applicability in radiation therapy. It also evaluates parametric and nonparametric image registration techniques and their applications in radiation therapy processes. The third section assesses the efficiency, robustness, and breadth of application of image segmentation approaches, including atlas-based, level set, and registration-based techniques. The fourth section focuses on advanced imaging techniques for radiotherapy, such as 3D image reconstruction and image registration using a graphics processor unit. With contributions from an international group of renowned authors, this book provides a comprehensive description of image segmentation and registration, in-room imaging, and advanced reconstruction techniques. Through many practical examples, it illustrates the clinical rationale and implementation of the techniques.

Handbook of Biomedical Image Analysis Springer

Segmentation and landmarking of computed tomographic (CT) images of pediatric patients are important and useful in computer-aided diagnosis (CAD), treatment planning, and objective analysis of normal as well as pathological regions. Identification and segmentation of organs and tissues in the presence of tumors are difficult. Automatic segmentation of the primary tumor mass in neuroblastoma could facilitate reproducible and objective analysis of the tumor's tissue composition, shape, and size. However, due to the heterogeneous tissue composition of the neuroblastic tumor, ranging from low-attenuation necrosis to high-attenuation calcification, segmentation of the tumor mass is a challenging problem. In this context, methods are described in this book for identification and segmentation of several abdominal and thoracic landmarks to assist in the segmentation of neuroblastic tumors in pediatric CT images. Methods to identify and segment automatically the peripheral artifacts and tissues, the rib structure, the vertebral column, the spinal canal, the diaphragm, and the pelvic surface are described. Techniques are also presented to evaluate quantitatively the results of segmentation of the vertebral column, the spinal canal, the diaphragm, and the pelvic girdle by comparing with the results of independent manual segmentation performed by a radiologist. The use of the landmarks and removal of several tissues and organs are shown to assist in limiting the scope of the tumor segmentation process to the abdomen, to lead to the reduction of the false-positive error, and to improve the result of segmentation of neuroblastic tumors. Table of Contents: Introduction to Medical Image Analysis / Image Segmentation / Experimental Design and Database / Ribs, Vertebral Column, and Spinal Canal / Delineation of the Diaphragm / Delineation of the Pelvic Girdle / Application of Landmarking / Concluding Remarks

Medical Imaging Springer

This book constitutes the First 3D Head and Neck Tumor Segmentation in PET/CT Challenge, HECKTOR 2020, which was held in conjunction with the 23rd International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2020, in Lima, Peru, in October 2020. The challenge took place virtually due to the COVID-19 pandemic. The 2 full and 8 short papers presented together with an overview paper in this volume were carefully reviewed and selected form numerous submissions. This challenge aims to evaluate and compare the current state-of-the-art methods for automatic head and neck tumor segmentation. In the context of this challenge, a dataset of 204 delineated PET/CT images was made available for training as well as 53 PET/CT images for testing. Various deep learning methods were developed by the participants with excellent results.

Medical Imaging CRC Press

The volume provides a wealth of up-to-date information on developments and applications of deep learning in healthcare

and medicine, providing deep insight and understanding of novel applications that address the tough questions of disease diagnosis, prevention, and immunization. The volume looks at applications of deep learning for major medical challenges such as cancer detection and identification, birth asphyxia among neonates, kidney abnormalities, white blood cell segmentation, diabetic retinopathy detection, and Covid-19 diagnosis, prevention, and immunization. The volume discusses applications of deep learning in detection, diagnosis, intensive examination and evaluation, genomic sequencing, convolutional neural networks for image recognition and processing, and more for health issues such as kidney problems, brain tumors, lung damage, and breast cancer. The authors look at ML for brain tumor segmentation, in lung CT scans, in digital X-ray devices, and for logistic and transport systems for effective delivery of healthcare.