

Brain Tumor Detection In Medical Imaging Using Matlab

Medical image processing and its segmentation is an active and interesting area for researchers. It has reached at the tremendous place in diagnosing tumors after the discovery of CT and MRI. MRI is an useful tool to detect the brain tumor and segmentation is performed to carry out the useful portion from an image. The purpose of this paper is to provide an overview of different image segmentation methods like watershed algorithm, morphological operations, neutrosophic sets, thresholding, K-means clustering, fuzzy C-means etc using MR images.

Brain tumor classification is a challenging task in the field of medical image processing. The present study proposes a hybrid method using Neutrosophy and Convolutional Neural Network (NS-CNN). It aims to classify tumor region areas that are segmented from brain images as benign and malignant. In the first stage, MRI images were segmented using the neutrosophic set – expert maximum fuzzy-sure entropy (NS-EMFSE) approach.

The field of healthcare is seeing a rapid expansion of technological advancement within current medical practices. The implementation of technologies including neural networks, multi-modal imaging, genetic algorithms, and soft computing are assisting in predicting and identifying diseases, diagnosing cancer, and the examination of cells. Implementing these biomedical technologies remains a challenge for hospitals worldwide, creating a need for research on the specific applications of these computational techniques. Deep Neural Networks for Multimodal Imaging and Biomedical Applications provides research exploring the theoretical and practical aspects of emerging data computing methods and imaging techniques within healthcare and biomedicine. The publication provides a complete set of information in a single module starting from developing deep neural networks to predicting disease by employing multi-modal imaging. Featuring coverage on a broad range of topics such as prediction models, edge computing, and quantitative measurements, this book is ideally designed for researchers, academicians, physicians, IT consultants, medical software developers, practitioners, policymakers, scholars, and students seeking current research on biomedical advancements and developing computational methods in healthcare.

This book constitutes the refereed proceedings of the 21st Annual Conference on Medical Image Understanding and Analysis, MIUA 2017, held in Edinburgh, UK, in July 2017. The 82 revised full papers presented were carefully reviewed and selected from 105 submissions. The papers are organized in topical sections on retinal imaging, ultrasound imaging, cardiovascular imaging, oncology imaging, mammography image analysis, image enhancement and alignment, modeling and segmentation of preclinical, body and histological imaging, feature detection and classification. The chapters 'Model-Based Correction of Segmentation Errors in Digitised Histological Images' and 'Unsupervised Superpixel-Based Segmentation of Histopathological Images with Consensus Clustering' are open access under a CC BY 4.0 license.

There have been a lot of trials to apply information and communication technology (ICT) to other industrial sectors such as green convergence, smart screen & appliances, next generation broadcasting & media, mobile convergence networks, and other ICT convergence applications and services, all under the name of ICT convergence ICTC is a unique global premier event for researchers, industry professionals, and academics, which aims at interacting with and disseminating information on the latest developments in the emerging industrial convergence centered around the information and communication technologies More specifically, it will address challenges with realizing ICT convergence over the various industrial sectors, including the infrastructures and applications in wireless & mobile communication, smart devices & consumer appliances, mobile cloud computing, green communication, healthcare and bioinformatics, Internet of Things (IoT), M2M, Security, and intelligent transportation

This book describes the basics, the challenges and the limitations of state of the art brain tumor imaging and examines in detail its impact on diagnosis and treatment monitoring. It opens with an introduction to the clinically relevant physical principles of brain imaging. Since MR methodology plays a crucial role in brain imaging, the fundamental aspects of MR spectroscopy, MR perfusion and diffusion-weighted MR methods are described, focusing on the specific demands of brain tumor imaging. The potential and the limits of new imaging methodology are carefully addressed and compared to conventional MR imaging. In the main part of the book, the most important imaging criteria for the differential diagnosis of solid and necrotic brain tumors are delineated and illustrated in examples. A closing section is devoted to the use of MR methods for the monitoring of brain tumor therapy. The book is intended for radiologists, neurologists, neurosurgeons, oncologists and other scientists in the biomedical field with an interest in neuro-oncology.

Brain Tumor MRI Image Segmentation Using Deep Learning Techniques offers a description of deep learning approaches used for the segmentation of brain tumors. The book demonstrates core concepts of deep learning algorithms by using diagrams, data tables and examples to illustrate brain tumor segmentation. After introducing basic concepts of deep learning-based brain tumor segmentation, sections cover techniques for modeling, segmentation and properties. A focus is placed on the application of different types of convolutional neural networks, like single path, multi path, fully convolutional network, cascade convolutional neural networks, Long Short-Term Memory - Recurrent Neural Network and Gated Recurrent Units, and more. The book also highlights how the use of deep neural networks can address new questions and protocols, as well as improve upon existing challenges in brain tumor segmentation. Provides readers with an understanding of deep learning-based approaches in the field of brain tumor segmentation, including preprocessing techniques Integrates recent advancements in the field, including the transformation of low-resolution brain tumor images into super-resolution images using deep learning-based methods, single path Convolutional Neural Network based brain tumor segmentation, and much more Includes coverage of Long Short-Term Memory (LSTM) based Recurrent Neural Network (RNN), Gated Recurrent Units (GRU) based Recurrent Neural Network (RNN), Generative Adversarial Networks (GAN), Auto Encoder based brain tumor segmentation, and Ensemble deep learning Model based brain tumor segmentation Covers research Issues and the future of deep learning-based brain tumor segmentation

This eighth volume in the series Methods of Cancer Diagnosis, Therapy, and Prognosis discusses in detail the classification of the CNS tumors as well as brain tumor imaging. Scientists and Clinicians have contributed state of the art chapters on their respective areas of expertise, providing the reader a whole field view of the CNS tumors and brain tumor imaging in Europe. This fully illustrated volume: Explains the genetics of malignant brain tumors and gene amplification using quantitative-PCR; Presents a large number of standard and new imaging modalities, including magnetic resonance imaging, functional magnetic resonance imaging, diffusion tensor imaging, amide proton transfer imaging, positron emission tomography, single photon emission computed tomography, magnetic resonance single voxel spectroscopy and intraoperative ultrasound imaging, for staging and diagnosing

various primary and secondary brain cancers; Explains the usefulness of imaging methods for planning and monitoring (assessment) therapy for cancers; Discusses diagnosis and treatment of primary CNS lymphomas, CNS atypical teratoid/rhabdoid and CNS Rosai-Dorfman disease; Includes the subject of translational medicine. Professor Hayat has summarized the problems associated with the complexities of research publications and has been successful in editing a must-read volume for oncologists, cancer researchers, medical teachers and students of cancer biology.

Original contributions from researchers describing their unpublished research contribution which is not currently under review by another conference or journal and addressing state of the art research are invited to share their work in all areas of Data Science, Machine Learning and its applications but are not limited to Ubiquitous Intelligence and Computing Web Intelligence and Computing Swarm Intelligence Mobile Computing Sensor Networks and Social Sensing Wireless Mesh Networks Wireless Networks Management Wireless Protocols and Architectures Multi Agent Systems Human Computer Interaction Data Mining and Knowledge Discovery Knowledge Management and Networks Data Intensive Computing Architecture Intelligent E Learning Systems Smart Environments and Applications Genetic Algorithms Evolutionary Computation Soft Computing Machine Learning Neural Networks Pattern Recognition Intelligent Control

This volume provides a deeper understanding of the diagnosis of brain tumors by correlating radiographic imaging features with the underlying pathological abnormalities. All modern imaging modalities are used to complete a diagnostic overview of brain tumors with emphasis on recent advances in diagnostic neuroradiology. High-quality illustrations depicting common and uncommon imaging characteristics of a wide range of brain tumors are presented and analysed, drawing attention to the ways in which these characteristics reflect different aspects of pathology. Important theoretical considerations are also discussed. Since the first edition, chapters have been revised and updated and new material has been added, including detailed information on the clinical application of functional MRI and diffusion tensor imaging. Radiologists and other clinicians interested in the current diagnostic approach to brain tumors will find this book to be an invaluable and enlightening clinical tool.

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

The conventional method in medicine for brain MR images classification and tumor detection is by human inspection. Operator-assisted classification methods are impractical for large amounts of data and are also non-reproducible. MR images also always contain a noise caused by operator performance which can lead to serious inaccuracies classification. The use of artificial intelligent techniques, for instance, neural networks, fuzzy logic, neuro fuzzy have shown great potential in this field. Hence, in this project the neuro fuzzy system or ANFIS was applied for classification and detection purposes. Decision making was performed in two stages: feature extraction using the principal component analysis (PCA) and the ANFIS trained with the backpropagation gradient descent method in combination with the least squares method. The performance of the ANFIS classifier was evaluated in terms of training performance and classification accuracies and the results confirmed that the proposed ANFIS classifier has potential in detecting the tumors.

The book features selected high-quality papers presented in International Conference on Computing, Power and Communication Technologies 2019 (GUCON 2019), organized by Galgotias University, India, in September 2019. Discussing in detail topics related to electronics devices, circuits and systems; signal processing; and bioinformatics, multimedia and machine learning, the papers in this book provide interesting reading for researchers, engineers, and students.

Healthcare sector is characterized by difficulty, dynamism and variety. In 21st century, healthcare domain is surrounded by tons of challenges in terms of Disease detection, prevention, high costs, skilled technicians and better infrastructure. In order to handle these challenges, Intelligent Healthcare management technologies are required to play an effective role in improvising patient's life. Healthcare organizations also need to continuously discover useful and actionable knowledge to gain insight from tons of data for various purposes for saving lives, reducing medical operations errors, enhancing efficiency, reducing costs and making the whole world a healthy world. Applying Swarm Intelligence and Evolutionary Algorithms in Healthcare and Drug Development is essential nowadays. The objective of this book is to highlight various Swarm Intelligence and Evolutionary Algorithms techniques for various medical issues in terms of Cancer Diagnosis, Brain Tumor, Diabetic Retinopathy, Heart disease as well as drug design and development. The book will act as one-stop reference for readers to think and explore Swarm Intelligence and Evolutionary Algorithms seriously for real-time patient diagnosis, as the book provides solutions to various complex diseases found critical for medical practitioners to diagnose in real-world. Key Features: Highlights the importance and applications of Swarm Intelligence and Evolutionary Algorithms in Healthcare industry. Elaborates Swarm Intelligence and Evolutionary Algorithms for Cancer Detection. In-depth coverage of computational methodologies, approaches and techniques based on Swarm Intelligence and Evolutionary Algorithms for detecting Brain Tumour including deep learning to optimize brain tumor diagnosis. Provides a strong foundation for Diabetic Retinopathy detection using Swarm and Evolutionary algorithms. Focuses on applying Swarm Intelligence and Evolutionary Algorithms for Heart Disease detection and diagnosis. Comprehensively covers the role of Swarm Intelligence and Evolutionary Algorithms for Drug Design and Discovery. The book will play a significant role for Researchers, Medical Practitioners, Healthcare Professionals and Industrial Healthcare Research and Development wings to conduct advanced research in Healthcare using Swarm Intelligence and Evolutionary Algorithms techniques.

High-Resolution Neuroimaging Basic Physical Principles and Clinical Applications BoD – Books on Demand

This book presents the latest research pertaining to the diagnosis, therapy and management of diffuse low-grade gliomas (DLGG) in adults, with a particular focus on the path towards individualised therapy for this kind of tumour. Recent research on the natural history of DLGGs and their interaction with the brain has led to new diagnostic and therapeutic strategies which increase survival and quality of life of the patient, and these methods are described in this book.

Medical imaging has transformed the ways in which various conditions, injuries, and diseases are identified, monitored, and treated. As various types of digital visual representations continue to advance and improve, new opportunities for their use in medical practice will likewise evolve. Medical Imaging: Concepts, Methodologies, Tools, and Applications presents a compendium of research on digital imaging technologies in a variety of healthcare settings. This multi-volume work contains practical examples of implementation, emerging trends, case studies, and technological innovations essential for using imaging technologies for making medical decisions. This comprehensive publication is an essential resource for medical practitioners, digital imaging technologists, researchers, and medical students.

Recent advancements in the technology of medical imaging, such as CT and MRI scanners, are making it possible to create more detailed 3D and 4D images. These powerful images require vast amounts of digital data to help with the diagnosis of the patient. Artificial intelligence (AI) must play a vital role in supporting with the analysis of this medical imaging data, but it will only be viable as long as healthcare professionals and AI interact to embrace deep thinking platforms such as automation in the identification of diseases in patients. AI Innovation in Medical Imaging Diagnostics is an essential reference source that examines AI applications in medical imaging that can transform hospitals to become more efficient in the management of patient treatment plans through the production of faster imaging and the reduction of radiation dosages through the PET and SPECT imaging modalities. The book also explores how data clusters from these images can be translated into small data packages that can be accessed by healthcare departments to give a real-time insight into patient care and required interventions. Featuring research on topics such as assistive healthcare, cancer detection, and machine learning, this book is ideally designed for healthcare administrators, radiologists, data analysts, computer science professionals, medical imaging specialists, diagnosticians, medical professionals, researchers, and students.

This two-volume set (CCIS 150 and CCIS 151) constitutes the refereed proceedings of the Second International Conference on Ubiquitous Computing and Multimedia Applications, UCMA 2011, held in Daejeon, Korea, in April 2011. The 86 revised full papers presented were carefully reviewed and selected from 570 submissions. Focusing on various aspects of advances in multimedia applications and ubiquitous computing with computational sciences, mathematics and information technology the papers present current research in the area of multimedia and ubiquitous environment including models and systems, new directions, novel applications associated with the utilization, and acceptance of ubiquitous computing devices and systems.

The process of accurate detection of edges of MRI images of a brain is always a challenging but interesting problem. Accurate detection is very important and critical for the generation of correct diagnosis. The major problem that comes across while analyzing MRI images of a brain is inaccurate data. The process of segmentation of brain MRI image involves the problem of searching anatomical regions of interest, which can help radiologists to extract shapes, appearance, and other structural features for diagnosis of diseases or treatment evaluation. The brain image segmentation is composed of many stages. During the last few years, preprocessing algorithms, techniques, and operators have emerged as a powerful tool for efficient extraction of regions of interest, performing basic algebraic operations on images, enhancing specific image features, and reducing data on both resolution and brightness. Edge detection is one of the techniques of image segmentation. Here from image segmentation, tumor is located. Finally, we try to retrieve tumor from MRI image of a brain in the form of edge more accurately and efficiently, by enhancing the performance of different kinds of edge detectors using fuzzy approach.

Cancer is a dense and an abnormal rapid multiplication (proliferation) of cells in the tissues of the human body. The brain tumor is one of the most dangerous and deadly tumors. Fortunately, the evolution of science has allowed us to create very efficient medical imaging techniques in order to discover this type of cancer. Chief among these techniques is magnetic resonance imaging (MRI) which is a very efficient technique compared to ultrasound. In this work, we are interested in the detection of this type of cancer allowing a three-dimensional (3D) reconstruction of MRI images. The segmentation methods used are based primarily on the Fuzzy C-Means algorithm that classifies and isolates parts of the brain tissue, and secondly on Distance Regularized Level Set Evolution technique for tumor detection. The obtained results show the effectiveness of this approach to detect brain tumor. The 3D reconstruction is finally carried out to better visualize the tumor as a whole and to detect its expansion. It is conducted using an indirect volume rendering method, which is the Marching Cubes algorithm. In modern medicine, imaging is the most effective tool for diagnostics, treatment planning and therapy. Almost all modalities have went to directly digital acquisition techniques and processing of this image data have become an important option for health care in future. This book is written by a team of internationally recognized experts from all over the world. It provides a brief but complete overview on medical image processing and analysis highlighting recent advances that have been made in academics. Color figures are used extensively to illustrate the methods and help the reader to understand the complex topics.

This volume presents the contributions of the fifth International Conference on Advancements of Medicine and Health Care through Technology (Meditech 2016), held in Cluj-Napoka, Romania. The papers of this Proceedings volume present new developments in - Health Care Technology, - Medical Devices, Measurement and Instrumentation, - Medical Imaging, Image and Signal Processing, - Modeling and Simulation, - Molecular Bioengineering, - Biomechanics.

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.

These are the proceedings of the 10th European Conference on Symbolic and Quantitative Approaches to Reasoning with Uncertainty, ECSQARU 2009, held in Verona (Italy), July 1–3, 2009. The biennial ECSQARU conferences are a major forum for advances in the theory and practice of reasoning under uncertainty. The first ECSQARU conference was held in Marseille (1991), and since then it has been held in Granada (1993), Fribourg (1995), Bonn (1997), London (1999), Toulouse (2001), Aalborg (2003), Barcelona (2005) and Hammamet (2007). The 76 papers gathered in this volume were selected out of 118 submissions from 34 countries, after a rigorous review process. In addition, the conference included invited lectures by three outstanding researchers in the area: Isabelle Bloch ("Fuzzy and bipolar mathematical morphology, applications in spatial reasoning"), Petr Cintula ("From (deductive) fuzzy logic to (logic-based) fuzzy mathematics"), and Daniele Mundici ("Conditionals and independence in many-valued logics"). Two special sessions were represented during the conference: "Conditioning, dependence, inference" (organized by Giulianella Coletti and Barbara Vantaggi) and "Mathematical fuzzy logic" (organized by Stefano Aguzzoli, Brunella Gerla, Lluís Godo, Vincenzo Marra, Franco Montagna) On the whole, the program of the conference provided a broad, rich and up-to-date perspective of the current high-level research in the area which is reflected in the contents of this volume.

"This book examines the application of artificial intelligence in medical imaging diagnostics"--

This book constitutes the thoroughly refereed post-workshop proceedings of the International Workshop on Medical Computer Vision, MCV 2010, held in Beijing, China, in September 2010 as a satellite event of the 13th International Conference on Medical Image Computing and Computer Assisted Intervention, MICCAI 2010. The 10 revised full papers and 11 revised poster papers presented were carefully reviewed and selected from 38 initial submissions. The papers explore the use of modern image recognition technology in tasks such as semantic anatomy parsing, automatic segmentation and quantification, anomaly detection and categorization, data harvesting, semantic navigation and visualization, data organization and clustering, and general-purpose

automatic understanding of medical images.

The 14 International Conference on Knowledge-Based and Intelligent Information and Engineering Systems was held during September 8–10, 2010 in Cardiff, UK. The conference was organized by the School of Engineering at Cardiff University, UK and KES International. KES2010 provided an international scientific forum for the presentation of the results of high-quality research on a broad range of intelligent systems topics. The conference attracted over 360 submissions from 42 countries and 6 continents: Argentina, Australia, Belgium, Brazil, Bulgaria, Canada, Chile, China, Croatia, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong ROC, Hungary, India, Iran, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, The Netherlands, New Zealand, Pakistan, Poland, Romania, Singapore, Slovenia, Spain, Sweden, Syria, Taiwan, Tunisia, Turkey, UK, USA and Vietnam. The conference consisted of 6 keynote talks, 11 general tracks and 29 invited sessions and workshops, on the applications and theory of intelligent systems and related areas. The distinguished keynote speakers were Christopher Bishop, UK, Nikola Stokich, New Zealand, Saeid Nahavandi, Australia, Tetsuo Sawaragi, Japan, Yuzuru Tanaka, Japan and Roger Whitaker, UK. Over 240 oral and poster presentations provided excellent opportunities for the presentation of interesting new research results and discussion about them, leading to knowledge transfer and generation of new ideas. Extended versions of selected papers were considered for publication in the International Journal of Knowledge-Based and Intelligent Engineering Systems, Engineering Applications of Artificial Intelligence, Journal of Intelligent Manufacturing, and Neural Computing and Applications.

The book is a collection of best papers presented in International Conference on Intelligent Computing and Applications (ICICA 2016) organized by Department of Computer Engineering, D.Y. Patil College of Engineering, Pune, India during 20-22 December 2016. The book presents original work, information, techniques and applications in the field of computational intelligence, power and computing technology. This volume also talks about image language processing, computer vision and pattern recognition, machine learning, data mining and computational life sciences, management of data including Big Data and analytics, distributed and mobile systems including grid and cloud infrastructure.

Dr. Ahmet Mesur Halefoğlu mostly deals with research fields in body imaging and neuroradiology with multidetector computed tomography and high-resolution magnetic resonance imaging. He has served as postdoctoral research fellow at Johns Hopkins Hospital. Currently, he is working as an associate professor of radiology in Istanbul, Turkey. He has more than 50 high-impact-factor publications and has written 3 book chapters. He is a member of Turkish Society of Radiology and European Society of Radiology. During the recent years, there have been major breakthroughs in MRI due to developments in scanner technology and pulse sequencing. These important achievements have led to remarkable improvements in neuroimaging and advanced techniques, including diffusion imaging, diffusion tensor imaging, perfusion imaging, magnetic resonance spectroscopy, and functional MRI. These advanced neuroimaging techniques have enabled us to achieve invaluable insights into tissue microstructure, microvasculature, metabolism, and brain connectivity.

The book discusses the impact of machine learning and computational intelligent algorithms on medical image data processing, and introduces the latest trends in machine learning technologies and computational intelligence for intelligent medical image analysis. The topics covered include automated region of interest detection of magnetic resonance images based on center of gravity; brain tumor detection through low-level features detection; automatic MRI image segmentation for brain tumor detection using the multi-level sigmoid activation function; and computer-aided detection of mammographic lesions using convolutional neural networks.

"Provides a current review of computer processing algorithms for the identification of lesions, abnormal masses, cancer, and disease in medical images. Presents useful examples from numerous imaging modalities for increased recognition of anomalies in MRI, CT, SPECT and digital/film X-Ray."

A must-have reference, this new edition provides practical information on treatment guidelines, details of diagnosis and therapy, and personal recommendations on patient management from experts in the field. Consistently formatted chapters allow for a user-friendly presentation for quick access of key information by the practicing clinician. Completely updated, this new edition includes all of the latest developments in treatment strategies of medical, surgical and radiation oncologists.

The book discusses varied topics pertaining to advanced or up-to-date techniques in medical imaging using artificial intelligence (AI), image recognition (IR) and machine learning (ML) algorithms/techniques. Further, coverage includes analysis of chest radiographs (chest x-rays) via stacked generalization models, TB type detection using slice separation approach, brain tumor image segmentation via deep learning, mammogram mass separation, epileptic seizures, breast ultrasound images, knee joint x-ray images, bone fracture detection and labeling, and diabetic retinopathy. It also reviews 3D imaging in biomedical applications and pathological medical imaging.

The volume contains latest research work presented at International Conference on Computing and Communication Systems (I3CS 2016) held at North Eastern Hill University (NEHU), Shillong, India. The book presents original research results, new ideas and practical development experiences which concentrate on both theory and practices. It includes papers from all areas of information technology, computer science, electronics and communication engineering written by researchers, scientists, engineers and scholar students and experts from India and abroad.

This book (vol. 1) presents the proceedings of the IUPESM World Congress on Biomedical Engineering and Medical Physics, a triennially organized joint meeting of medical physicists, biomedical engineers and adjoining health care professionals. Besides the purely scientific and technological topics, the 2018 Congress will also focus on other aspects of professional involvement in health care, such as education and training, accreditation and certification, health technology assessment and patient safety. The IUPESM meeting is an important forum for medical physicists and biomedical engineers in medicine and healthcare learn and share knowledge, and discuss the latest research outcomes and technological advancements as well as new ideas in both medical physics and biomedical engineering field.

Magnetic resonance imaging (MRI) is widely used medical technology for diagnosis of various tissue abnormalities, detection of tumors. The active development in the computerized medical image segmentation has played a vital role in scientific research. This helps the doctors to take necessary treatment in an easy manner with fast decision making. Brain tumor segmentation is a hot point in the research field of Information technology with biomedical engineering. The brain tumor segmentation is motivated by assessing tumor growth, treatment responses, computer-based surgery, treatment of radiation therapy, and developing tumor growth models. Therefore, computer-aided diagnostic system is meaningful in medical treatments to reducing the workload of

doctors and giving the accurate results. This chapter explains the causes, awareness of brain tumor segmentation and its classification, MRI scanning process and its operation, brain tumor classifications, and different segmentation methodologies. The book covers the most recent developments in machine learning, signal analysis, and their applications. It covers the topics of machine intelligence such as: deep learning, soft computing approaches, support vector machines (SVMs), least square SVMs (LSSVMs) and their variants; and covers the topics of signal analysis such as: biomedical signals including electroencephalogram (EEG), magnetoencephalography (MEG), electrocardiogram (ECG) and electromyogram (EMG) as well as other signals such as speech signals, communication signals, vibration signals, image, and video. Further, it analyzes normal and abnormal categories of real-world signals, for example normal and epileptic EEG signals using numerous classification techniques. The book is envisioned for researchers and graduate students in Computer Science and Engineering, Electrical Engineering, Applied Mathematics, and Biomedical Signal Processing.

Recent years have witnessed the deployment of ever expanding range of digital electronics and communication technologies to enable innovative opportunities for meeting the demands posed by both economy and society. The increasing computing and communication technologies and the widespread availability of electronics and wireless networking technologies have lowered the traditional barriers of science and technology by processing large amounts of data and also enhancing its accessibility and exchangeability. Henceforth deploying new innovative technologies in this domain will even more strengthen the bond between the research and real time applications, which can further reshape the way people socialize and interact with each other.

This 2 volume-set of IFIP AICT 583 and 584 constitutes the refereed proceedings of the 16th IFIP WG 12.5 International Conference on Artificial Intelligence Applications and Innovations, AIAI 2020, held in Neos Marmaras, Greece, in June 2020.* The 70 full papers and 5 short papers presented were carefully reviewed and selected from 149 submissions. They cover a broad range of topics related to technical, legal, and ethical aspects of artificial intelligence systems and their applications and are organized in the following sections: Part I: classification; clustering - unsupervised learning -analytics; image processing; learning algorithms; neural network modeling; object tracking - object detection systems; ontologies - AI; and sentiment analysis - recommender systems. Part II: AI ethics - law; AI constraints; deep learning - LSTM; fuzzy algebra - fuzzy systems; machine learning; medical - health systems; and natural language. *The conference was held virtually due to the COVID-19 pandemic.

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