Fundamentals Of Machine Learning And Deep Learning In Medicine

Miroslav Kubat

Fundamentals of Machine Learning and Deep Learning in Medicine Reza Borhani, Soheila Borhani, Aggelos K. Katsaggelos, 2022-11-18 This book provides an accessible introduction to the foundations of machine learning and deep learning in medicine for medical students, researchers, and professionals who are not necessarily initiated in advanced mathematics but yearn for a better understanding of this disruptive technology and its impact on medicine. Once an esoteric subject known to few outside of computer science and engineering departments, today artificial intelligence (AI) is a widely popular technology used by scholars from all across the academic universe. In particular, recent years have seen a great deal of interest in the AI subfields of machine learning and deep learning from researchers in medicine and life sciences, evidenced by the rapid growth in the number of articles published on the topic in peer-reviewed medical journals over the last decade. The demand for high-quality educational resources in this area has never been greater than it is today, and will only continue to grow at a rapid pace. Expert authors remove the veil of unnecessary complexity that often surrounds machine learning and deep learning by employing a narrative style that emphasizes intuition in place of abstract mathematical formalisms, allowing them to strike a delicate balance between practicality and theoretical rigor in service of facilitating the reader’s learning experience. Topics covered in the book include: mathematical encoding of medical data, linear regression and classification, nonlinear feature engineering, deep learning, convolutional and recurrent neural networks, and reinforcement learning. Each chapter ends with a collection of exercises for readers to practice and test their knowledge. This is an ideal introduction for medical students, professionals, and researchers interested in learning more about machine learning and deep learning. Readers who have taken at least one introductory mathematics course at the undergraduate-level (e.g., biostatistics or calculus) will be well-equipped to use this book without needing any additional prerequisites.

Fundamentals of Machine Learning Thomas Trappenberg, 2019-11-28 Interest in machine learning is exploding worldwide, both in research and for industrial applications. Machine learning is fast becoming a fundamental part of everyday life. This book is a brief introduction to this area - exploring its importance in a range of many disciplines, from
science to engineering, and even its broader impact on our society. The book is written in a style that strikes a balance between brevity of explanation, rigorous mathematical argument, and outlines principle ideas. At the same time, it provides a comprehensive overview of a variety of methods and their application within this field. This includes an introduction to Bayesian approaches to modeling, as well as deep learning. Writing small programs to apply machine learning techniques is made easy by high level programming systems, and this book shows examples in Python with the machine learning libraries 'sklearn' and 'Keras'. The first four chapters concentrate on the practical side of applying machine learning techniques. The following four chapters discuss more fundamental concepts that includes their formulation in a probabilistic context. This is followed by two more chapters on advanced models, that of recurrent neural networks and that of reinforcement learning. The book closes with a brief discussion on the impact of machine learning and AI on our society. Fundamentals of Machine Learning provides a brief and accessible introduction to this rapidly growing field, one that will appeal to students and researchers across computer science and computational neuroscience, as well as the broader cognitive sciences.

**Introduction to Deep Learning for Healthcare**

Cao Xiao, Jimeng Sun, 2021-11-11

This textbook presents deep learning models and their healthcare applications. It focuses on rich health data and deep learning models that can effectively model health data. Healthcare data: Among all healthcare technologies, electronic health records (EHRs) had vast adoption and a significant impact on healthcare delivery in recent years. One crucial benefit of EHRs is to capture all the patient encounters with rich multi-modality data. Healthcare data include both structured and unstructured information. Structured data include various medical codes for diagnoses and procedures, lab results, and medication information. Unstructured data contain 1) clinical notes as text, 2) medical imaging data such as X-rays, echocardiogram, and magnetic resonance imaging (MRI), and 3) time-series data such as the electrocardiogram (ECG) and electroencephalogram (EEG). Beyond the data collected during clinical visits, patient self-generated/reported data start to grow thanks to wearable sensors’ increasing use. The authors present deep learning case studies on all data described. Deep learning models: Neural network models are a class of machine learning methods with a long history. Deep learning models are neural networks of many layers, which can extract multiple levels of features from raw data. Deep learning applied to healthcare is a natural and promising direction with many initial successes. The authors cover deep neural networks, convolutional neural networks, recurrent neural networks, embedding methods, autoencoders, attention models, graph neural networks, memory networks, and generative models. It’s presented with concrete healthcare case studies such as clinical predictive modeling, readmission prediction, phenotyping, x-ray classification, ECG diagnosis, sleep monitoring, automatic diagnosis coding from clinical notes, automatic deidentification, medication recommendation, drug discovery (drug property prediction and molecule generation), and clinical trial matching. This textbook targets graduate-level students focused on deep learning methods and their healthcare applications. It can be used for the concepts of deep learning and its applications as well. Researchers working in this field
will also find this book to be extremely useful and valuable for their research.

An Introduction to Machine Learning  Miroslav Kubat, 2017-08-31 This textbook presents fundamental machine learning concepts in an easy to understand manner by providing practical advice, using straightforward examples, and offering engaging discussions of relevant applications. The main topics include Bayesian classifiers, nearest-neighbor classifiers, linear and polynomial classifiers, decision trees, neural networks, and support vector machines. Later chapters show how to combine these simple tools by way of “boosting,” how to exploit them in more complicated domains, and how to deal with diverse advanced practical issues. One chapter is dedicated to the popular genetic algorithms. This revised edition contains three entirely new chapters on critical topics regarding the pragmatic application of machine learning in industry. The chapters examine multi-label domains, unsupervised learning and its use in deep learning, and logical approaches to induction. Numerous chapters have been expanded, and the presentation of the material has been enhanced. The book contains many new exercises, numerous solved examples, thought-provoking experiments, and computer assignments for independent work.

Machine Learning and Deep Learning in Medical Data Analytics and Healthcare Applications  Om Prakash Jena, Bharat Bhushan, Utku Kose, 2022-02-25 Machine Learning and Deep Learning in Medical Data Analytics and Healthcare Applications introduces and explores a variety of schemes designed to empower, enhance, and represent multi-institutional and multi-disciplinary machine learning (ML) and deep learning (DL) research in healthcare paradigms. Serving as a unique compendium of existing and emerging ML/DL paradigms for the healthcare sector, this book demonstrates the depth, breadth, complexity, and diversity of this multi-disciplinary area. It provides a comprehensive overview of ML/DL algorithms and explores the related use cases in enterprises such as computer-aided medical diagnostics, drug discovery and development, medical imaging, automation, robotic surgery, electronic smart records creation, outbreak prediction, medical image analysis, and radiation treatments. This book aims to endow different communities with the innovative advances in theory, analytical results, case studies, numerical simulation, modeling, and computational structuring in the field of ML/DL models for healthcare applications. It will reveal different dimensions of ML/DL applications and will illustrate their use in the solution of assorted real-world biomedical and healthcare problems. Features: Covers the fundamentals of ML and DL in the context of healthcare applications Discusses various data collection approaches from various sources and how to use them in ML/DL models Integrates several aspects of AI-based computational intelligence such as ML and DL from diversified perspectives which describe recent research trends and advanced topics in the field Explores the current and future impacts of pandemics and risk mitigation in healthcare with advanced analytics Emphasizes feature selection as an important step in any accurate model simulation where ML/DL methods are used to help train the system and extract the positive solution implicitly This book is a valuable source of information for researchers, scientists, healthcare professionals, programmers,
and graduate-level students interested in understanding the applications of ML/DL in healthcare scenarios. Dr. Om Prakash Jena is an Assistant Professor in the Department of Computer Science, Ravenshaw University, Cuttack, Odisha, India. Dr. Bharat Bhushan is an Assistant Professor of Department of Computer Science and Engineering (CSE) at the School of Engineering and Technology, Sharda University, Greater Noida, India. Dr. Utku Kose is an Associate Professor in Suleyman Demirel University, Turkey.

**Fundamentals and Methods of Machine and Deep Learning** Pradeep Singh, 2022-03-02

FUNDAMENTALS AND METHODS OF MACHINE AND DEEP LEARNING

The book provides a practical approach by explaining the concepts of machine learning and deep learning algorithms, evaluation of methodology advances, and algorithm demonstrations with applications. Over the past two decades, the field of machine learning and its subfield deep learning have played a main role in software applications development. Also, in recent research studies, they are regarded as one of the disruptive technologies that will transform our future life, business, and the global economy. The recent explosion of digital data in a wide variety of domains, including science, engineering, Internet of Things, biomedical, healthcare, and many business sectors, has declared the era of big data, which cannot be analysed by classical statistics but by the more modern, robust machine learning and deep learning techniques. Since machine learning learns from data rather than by programming hard-coded decision rules, an attempt is being made to use machine learning to make computers that are able to solve problems like human experts in the field. The goal of this book is to present a practical approach by explaining the concepts of machine learning and deep learning algorithms with applications. Supervised machine learning algorithms, ensemble machine learning algorithms, feature selection, deep learning techniques, and their applications are discussed. Also included in the eighteen chapters is unique information which provides a clear understanding of concepts by using algorithms and case studies illustrated with applications of machine learning and deep learning in different domains, including disease prediction, software defect prediction, online television analysis, medical image processing, etc. Each of the chapters briefly described below provides both a chosen approach and its implementation. Audience Researchers and engineers in artificial intelligence, computer scientists as well as software developers.


The application of machine learning is growing exponentially into every branch of business and science, including medical science. This book presents the integration of machine learning (ML) and deep learning (DL) algorithms that can be applied in the healthcare sector to reduce the time required by doctors, radiologists, and other medical professionals for analyzing, predicting, and diagnosing the conditions with accurate results. The book offers important key aspects in the development and implementation of ML and DL approaches toward developing prediction tools and models and improving medical diagnosis. The contributors explore the recent trends, innovations, challenges, and solutions, as well
as case studies of the applications of ML and DL in intelligent system-based disease diagnosis. The chapters also highlight the basics and the need for applying mathematical aspects with reference to the development of new medical models. Authors also explore ML and DL in relation to artificial intelligence (AI) prediction tools, the discovery of drugs, neuroscience, diagnosis in multiple imaging modalities, and pattern recognition approaches to functional magnetic resonance imaging images. This book is for students and researchers of computer science and engineering, electronics and communication engineering, and information technology; for biomedical engineering researchers, academicians, and educators; and for students and professionals in other areas of the healthcare sector. Presents key aspects in the development and the implementation of ML and DL approaches toward developing prediction tools, models, and improving medical diagnosis Discusses the recent trends, innovations, challenges, solutions, and applications of intelligent system-based disease diagnosis Examines DL theories, models, and tools to enhance health information systems Examines ML and DL in relation to AI prediction tools, discovery of drugs, neuroscience, and diagnosis in multiple imaging modalities Dr. K. Gayathri Devi is a Professor at the Department of Electronics and Communication Engineering, Dr. N.G.P Institute of Technology, Tamil Nadu, India. Dr. Kishore Balasubramanian is an Assistant Professor (Senior Scale) at the Department of EEE at Dr. Mahalingam College of Engineering & Technology, Tamil Nadu, India. Dr. Le Anh Ngoc is a Director of Swinburne Innovation Space and Professor in Swinburne University of Technology (Vietnam).

**Machine Learning for Critical Internet of Medical Things** Fadi Al-Turjman, Anand Nayyar, 2022-02-03 This book discusses the applications, challenges, and future trends of machine learning in medical domain, including both basic and advanced topics. The book presents how machine learning is helpful in smooth conduction of administrative processes in hospitals, in treating infectious diseases, and in personalized medical treatments. The authors show how machine learning can also help make fast and more accurate disease diagnoses, easily identify patients, help in new types of therapies or treatments, model small-molecule drugs in pharmaceutical sector, and help with innovations via integrated technologies such as artificial intelligence as well as deep learning. The authors show how machine learning also improves the physician’s and doctor’s medical capabilities to better diagnosis their patients. This book illustrates advanced, innovative techniques, frameworks, concepts, and methodologies of machine learning that will enhance the efficiency and effectiveness of the healthcare system. Provides researchers in machine and deep learning with a conceptual understanding of various methodologies of implementing the technologies in medical areas; Discusses the role machine learning and IoT play into locating different virus and diseases across the globe, such as COVID-19, Ebola, and cervical cancer; Includes fundamentals and advances in machine learning in the medical field, supported by significant case studies and practical applications.

**Artificial Intelligence and Deep Learning in Pathology** Stanley Cohen, 2020-06-02 Recent advances in computational algorithms, along with the advent of whole slide imaging as a platform for embedding artificial intelligence (AI), are
transforming pattern recognition and image interpretation for diagnosis and prognosis. Yet most pathologists have just a passing knowledge of data mining, machine learning, and AI, and little exposure to the vast potential of these powerful new tools for medicine in general and pathology in particular. In Artificial Intelligence and Deep Learning in Pathology, Dr. Stanley Cohen covers the nuts and bolts of all aspects of machine learning, up to and including AI, bringing familiarity and understanding to pathologists at all levels of experience. Focuses heavily on applications in medicine, especially pathology, making unfamiliar material accessible and avoiding complex mathematics whenever possible. Covers digital pathology as a platform for primary diagnosis and augmentation via deep learning, whole slide imaging for 2D and 3D analysis, and general principles of image analysis and deep learning. Discusses and explains recent accomplishments such as algorithms used to diagnose skin cancer from photographs, AI-based platforms developed to identify lesions of the retina, using computer vision to interpret electrocardiograms, identifying mitoses in cancer using learning algorithms vs. signal processing algorithms, and many more.

**Machine Learning Fundamentals**

Hyatt Saleh, 2018-11-29

With the flexibility and features of scikit-learn and Python, build machine learning algorithms that optimize the programming process and take application performance to a whole new level.

**Key Features**
- Explore scikit-learn uniform API and its application into any type of model
- Understand the difference between supervised and unsupervised models
- Learn the usage of machine learning through real-world examples

**Description**

As machine learning algorithms become popular, new tools that optimize these algorithms are also developed. *Machine Learning Fundamentals* explains you how to use the syntax of scikit-learn. You’ll study the difference between supervised and unsupervised models, as well as the importance of choosing the appropriate algorithm for each dataset. You’ll apply unsupervised clustering algorithms over real-world datasets, to discover patterns and profiles, and explore the process to solve an unsupervised machine learning problem. The focus of the book then shifts to supervised learning algorithms. You’ll learn to implement different supervised algorithms and develop neural network structures using the scikit-learn package. You’ll also learn how to perform coherent result analysis to improve the performance of the algorithm by tuning hyperparameters. By the end of this book, you will have gain all the skills required to start programming machine learning algorithms. What you will learn:
- Understand the importance of data representation
- Gain insights into the differences between supervised and unsupervised models
- Explore data using the Matplotlib library
- Study popular algorithms, such as k-means, Mean-Shift, and DBSCAN
- Measure model performance through different metrics
- Implement a confusion matrix using scikit-learn
- Study popular algorithms, such as Naïve-Bayes, Decision Tree, and SVM
- Perform error analysis to improve the performance of the model
- Learn to build a comprehensive machine learning program

**Who this book is for**

*Machine Learning Fundamentals* is designed for developers who are new to the field of machine learning and want to learn how to use the scikit-learn library to develop machine learning algorithms. You must have some knowledge and experience in Python.
programming, but you do not need any prior knowledge of scikit-learn or machine learning algorithms.

**Deep Learning in Healthcare** Yen-Wei Chen, Lakhmi C. Jain, 2019-11-18

This book provides a comprehensive overview of deep learning (DL) in medical and healthcare applications, including the fundamentals and current advances in medical image analysis, state-of-the-art DL methods for medical image analysis and real-world, deep learning-based clinical computer-aided diagnosis systems. Deep learning (DL) is one of the key techniques of artificial intelligence (AI) and today plays an important role in numerous academic and industrial areas. DL involves using a neural network with many layers (deep structure) between input and output, and its main advantage is that it can automatically learn data-driven, highly representative and hierarchical features and perform feature extraction and classification on one network. DL can be used to model or simulate an intelligent system or process using annotated training data. Recently, DL has become widely used in medical applications, such as anatomic modelling, tumour detection, disease classification, computer-aided diagnosis and surgical planning. This book is intended for computer science and engineering students and researchers, medical professionals and anyone interested using DL techniques.

**Machine Learning for Healthcare Systems** C. Karthik Chandran, M. Rajalakshmi, Sachi Nandan Mohanty, Subrata Chowdhury, 2023-09-22

The introduction of digital technology in the healthcare industry is marked by ongoing difficulties with implementation and use. Slow progress has been made in unifying different healthcare systems, and much of the world still lacks a fully integrated healthcare system. The intrinsic complexity and development of human biology, as well as the differences across patients, have repeatedly demonstrated the significance of the human element in the diagnosis and treatment of illnesses. But as digital technology develops, healthcare providers will undoubtedly need to use it more and more to give patients the best treatment possible. The extensive use of machine learning in numerous industries, including healthcare, has been made possible by advancements in data technologies, including storage capacity, processing capability, and data transit speeds. The need for a personalized medicine or precision medicine approach to healthcare has been highlighted by current trends in medicine due to the complexity of providing effective healthcare to each individual. Personalized medicine aims to identify, forecast, and analyze diagnostic decisions using vast volumes of healthcare data so that doctors may then apply them to each unique patient. These data may include, but are not limited to, information on a person’s genes or family history, medical imaging data, drug combinations, patient health outcomes at the community level, and natural language processing of pre-existing medical documentation. This book provides various insights into machine learning techniques in healthcare system data and its analysis. Recent technological advancements in the healthcare system represent cutting-edge innovations and global research successes in performance modelling, analysis, and applications.

**Machine Learning in Healthcare** Bikesh Kumar Singh, G.R. Sinha, 2022-02-17

Artificial intelligence (AI) and machine learning (ML) techniques play an important role in our daily lives by enhancing predictions and decision-making for the
public in several fields such as financial services, real estate business, consumer goods, social media, etc. Despite several studies that have proved the efficacy of AI/ML tools in providing improved healthcare solutions, it has not gained the trust of health-care practitioners and medical scientists. This is due to poor reporting of the technology, variability in medical data, small datasets, and lack of standard guidelines for application of AI. Therefore, the development of new AI/ML tools for various domains of medicine is an ongoing field of research. Machine Learning in Healthcare: Fundamentals and Recent Applications discusses how to build various ML algorithms and how they can be applied to improve healthcare systems. Healthcare applications of AI are innumerable: medical data analysis, early detection and diagnosis of disease, providing objective-based evidence to reduce human errors, curtailing inter- and intra-observer errors, risk identification and interventions for healthcare management, real-time health monitoring, assisting clinicians and patients for selecting appropriate medications, and evaluating drug responses. Extensive demonstrations and discussion on the various principles of machine learning and its application in healthcare is provided, along with solved examples and exercises. This text is ideal for readers interested in machine learning without any background knowledge and looking to implement machine-learning models for healthcare systems.

**Machine Learning for Healthcare Applications** Sachi Nandan Mohanty, G. Nalinipriya, Om Prakash Jena, Achyuth Sarkar, 2021-04-13

When considering the idea of using machine learning in healthcare, it is a Herculean task to present the entire gamut of information in the field of intelligent systems. It is, therefore, the objective of this book to keep the presentation narrow and intensive. This approach is distinct from others in that it presents detailed computer simulations for all models presented with explanations of the program code. It includes unique and distinctive chapters on disease diagnosis, telemedicine, medical imaging, smart health monitoring, social media healthcare, and machine learning for COVID-19. These chapters help develop a clear understanding of the working of an algorithm while strengthening logical thinking. In this environment, answering a single question may require accessing several data sources and calling on sophisticated analysis tools. While data integration is a dynamic research area in the database community, the specific needs of research have led to the development of numerous middleware systems that provide seamless data access in a result-driven environment. Since this book is intended to be useful to a wide audience, students, researchers and scientists from both academia and industry may all benefit from this material. It contains a comprehensive description of issues for healthcare data management and an overview of existing systems, making it appropriate for introductory and instructional purposes. Prerequisites are minimal; the readers are expected to have basic knowledge of machine learning. This book is divided into 22 real-time innovative chapters which provide a variety of application examples in different domains. These chapters illustrate why traditional approaches often fail to meet customers’ needs. The presented approaches provide a comprehensive overview of current technology. Each of these chapters, which are written by the main inventors of the presented systems, specifies requirements
and provides a description of both the chosen approach and its implementation. Because of the self-contained nature of these chapters, they may be read in any order. Each of the chapters use various technical terms which involve expertise in machine learning and computer science.

Foundations of Artificial Intelligence in Healthcare and Bioscience Louis J. Catania, 2020-11-25 Foundational Handbook of Artificial Intelligence in Healthcare and Bioscience: A User Friendly Guide for IT Professionals, Healthcare Providers, Researchers, and Clinicians uses color-coded illustrations to explain AI from its basics to modern technologies. Other sections cover extensive, current literature research and citations regarding AI’s role in the business and clinical aspects of health care. The book provides readers with a unique opportunity to appreciate AI technology in practical terms, understand its applications, and realize its profound influence on the clinical and business aspects of health care. Artificial Intelligence is a disruptive technology that is having a profound and growing influence on the business of health care as well as medical diagnosis, treatment, research and clinical delivery. The AI relationships in health care are complex, but understandable, especially when discussed and developed from their foundational elements through to their practical applications in health care. Provides an illustrated, foundational guide and comprehensive descriptions of what Artificial Intelligence is and how it functions Integrates a comprehensive discussion of AI applications in the business of health care Presents in-depth clinical and AI-related discussions on diagnostic medicine, therapeutic medicine, and prevalent disease categories with an emphasis on immunology and genetics, the two categories most influenced by AI Includes comprehensive coverage of a variety of AI treatment applications, including medical/pharmaceutical care, nursing care, stem cell therapies, robotics, and 10 common disease categories with AI applications.

Deep Learning for Medical Decision Support Systems Utku Kose, Omer Deperlioglu, Jafar Alzubi, Bogdan Patrut, 2020-06-17 This book explores various applications of deep learning-oriented diagnosis leading to decision support, while also outlining the future face of medical decision support systems. Artificial intelligence has now become a ubiquitous aspect of modern life, and especially machine learning enjoys great popularity, since it offers techniques that are capable of learning from samples to solve newly encountered cases. Today, a recent form of machine learning, deep learning, is being widely used with large, complex quantities of data, because today’s problems require detailed analyses of more data. This is critical, especially in fields such as medicine. Accordingly, the objective of this book is to provide the essentials of and highlight recent applications of deep learning architectures for medical decision support systems. The target audience includes scientists, experts, MSc and PhD students, postdocs, and any readers interested in the subject discussed. The book can be used as a reference work to support courses on artificial intelligence, machine/deep learning, medical and biomedicaleducation.

Machine Learning and Medical Imaging Guorong Wu, Dinggang Shen, Mert Sabuncu, 2016-08-11 Machine Learning and
Medical Imaging presents state-of-the-art machine learning methods in medical image analysis. It first summarizes cutting-edge machine learning algorithms in medical imaging, including not only classical probabilistic modeling and learning methods, but also recent breakthroughs in deep learning, sparse representation/coding, and big data hashing. In the second part leading research groups around the world present a wide spectrum of machine learning methods with application to different medical imaging modalities, clinical domains, and organs. The biomedical imaging modalities include ultrasound, magnetic resonance imaging (MRI), computed tomography (CT), histology, and microscopy images. The targeted organs span the lung, liver, brain, and prostate, while there is also a treatment of examining genetic associations. Machine Learning and Medical Imaging is an ideal reference for medical imaging researchers, industry scientists and engineers, advanced undergraduate and graduate students, and clinicians. Demonstrates the application of cutting-edge machine learning techniques to medical imaging problems Covers an array of medical imaging applications including computer assisted diagnosis, image guided radiation therapy, landmark detection, imaging genomics, and brain connectomics Features self-contained chapters with a thorough literature review Assesses the development of future machine learning techniques and the further application of existing techniques

**Machine Learning and Deep Learning in Efficacy Improvement of Healthcare Systems**

Om Prakash Jena, Bharat Bhushan, Nitin Rakesh, Parma Nand Astya, Yousef Farhaoui, 2022-05-18
The goal of medical informatics is to improve life expectancy, disease diagnosis and quality of life. Medical devices have revolutionized healthcare and have led to the modern age of machine learning, deep learning and Internet of Medical Things (IoMT) with their proliferation, mobility and agility. This book exposes different dimensions of applications for computational intelligence and explains its use in solving various biomedical and healthcare problems in the real world. This book describes the fundamental concepts of machine learning and deep learning techniques in a healthcare system. The aim of this book is to describe how deep learning methods are used to ensure high-quality data processing, medical image and signal analysis and improved healthcare applications. This book also explores different dimensions of computational intelligence applications and illustrates its use in the solution of assorted real-world biomedical and healthcare problems. Furthermore, it provides the healthcare sector with innovative advances in theory, analytical approaches, numerical simulation, statistical analysis, modelling, advanced deployment, case studies, analytical results, computational structuring and significant progress in the field of machine learning and deep learning in healthcare applications. FEATURES: Explores different dimensions of computational intelligence applications and illustrates its use in the solution of assorted real-world biomedical and healthcare problems Provides guidance in developing intelligence-based diagnostic systems, efficient models and cost-effective machines Provides the latest research findings, solutions to the concerning issues and relevant theoretical frameworks in the area of machine learning and deep learning for healthcare systems Describes experiences and findings relating to protocol design, prototyping, experimental evaluation, real
testbeds and empirical characterization of security and privacy interoperability issues in healthcare applications. Explores and illustrates the current and future impacts of pandemics and mitigates risk in healthcare with advanced analytics. This book is intended for students, researchers, professionals, and policy makers working in the fields of public health and in the healthcare sector. Scientists and IT specialists will also find this book beneficial for research exposure and new ideas in the field of machine learning and deep learning.

**Machine Learning in Medicine** Ayman El-Baz, Jasjit S. Suri, 2021-08-04

Machine Learning in Medicine covers the state-of-the-art techniques of machine learning and their applications in the medical field. It presents several computer-aided diagnosis (CAD) systems, which have played an important role in the diagnosis of several diseases in the past decade, e.g., cancer detection, resulting in the development of several successful systems. New developments in machine learning may make it possible in the near future to develop machines that are capable of completely performing tasks that currently cannot be completed without human aid, especially in the medical field. This book covers such machines, including convolutional neural networks (CNNs) with different activation functions for small- to medium-size biomedical datasets, detection of abnormal activities stemming from cognitive decline, thermal dose modelling for thermal ablative cancer treatments, dermatological machine learning clinical decision support systems, artificial intelligence-powered ultrasound for diagnosis, practical challenges with possible solutions for machine learning in medical imaging, epilepsy diagnosis from structural MRI, Alzheimer's disease diagnosis, classification of left ventricular hypertrophy, and intelligent medical language understanding. This book will help to advance scientific research within the broad field of machine learning in the medical field. It focuses on major trends and challenges in this area and presents work aimed at identifying new techniques and their use in biomedical analysis, including extensive references at the end of each chapter.

**Fundamentals of Machine Learning for Predictive Data Analytics, second edition** John D. Kelleher, Brian MacNamee, Aoife D'Arcy, 2020-10-20

The second edition of a comprehensive introduction to machine learning approaches used in predictive data analytics, covering both theory and practice. Machine learning is often used to build predictive models by extracting patterns from large datasets. These models are used in predictive data analytics applications including price prediction, risk assessment, predicting customer behavior, and document classification. This introductory textbook offers a detailed and focused treatment of the most important machine learning approaches used in predictive data analytics, covering both theoretical concepts and practical applications. Technical and mathematical material is augmented with explanatory worked examples, and case studies illustrate the application of these models in the broader business context. This second edition covers recent developments in machine learning, especially in a new chapter on deep learning, and two new chapters that go beyond predictive analytics to cover unsupervised learning and reinforcement learning.
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**Introduction**

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