Deep Learning Ian Goodfellow Pdf

Ian Goodfellow,Yoshua Bengio,Aaron Courville

Deep Learning Ian Goodfellow,Yoshua Bengio,Aaron Courville,2016-11-18 An introduction to a broad range of topics in deep learning, covering mathematical and conceptual background, deep learning techniques used in industry, and research perspectives. "Written by three experts in the field, Deep Learning is the only comprehensive book on the subject." —Elon Musk, cochair of OpenAI; cofounder and CEO of Tesla and SpaceX Deep learning is a form of machine learning that enables computers to learn from experience and understand the world in terms of a hierarchy of concepts. Because the computer gathers knowledge from experience, there is no need for a human computer operator to formally specify all the knowledge that the computer needs. The hierarchy of concepts allows the computer to learn complicated concepts by building them out of simpler ones; a graph of these hierarchies would be many layers deep. This book introduces a broad range of topics in deep learning. The text offers mathematical and conceptual background, covering relevant concepts in linear algebra, probability theory and information theory, numerical computation, and machine learning. It describes deep learning techniques used by practitioners in industry, including deep feedforward networks, regularization, optimization algorithms, convolutional networks, sequence modeling, and practical methodology; and it surveys such applications as natural language processing, speech recognition, computer vision, online recommendation systems, bioinformatics, and videogames. Finally, the book offers research perspectives, covering such theoretical topics as linear factor models, autoencoders, representation learning, structured probabilistic models, Monte Carlo methods, the partition function, approximate inference, and deep generative models. Deep Learning can be used by undergraduate or graduate students planning careers in either industry or research, and by software engineers who want to begin using deep learning in their products or platforms. A website offers supplementary material for both readers and instructors.

Machine Learning V.K. Jain, Machine Learning employs techniques and theories drawn from many fields within the broad areas of mathematics, statistics, information science, and computer science, in particular from the sud-domains of machine learning, classification, cluster analysis, data mining, database, and visualization. Machine learning is perhaps the hottest thing in Silicon Valley right now, especially deep learning. We have Google's class on Tensor Flow, which teaches you everything you need to know to work in Silicon Valley's top companies. The reason why it is so hot is because it can take over many repetitive, mindless tasks. It'll make doctor better doctors, and lawyers better lawyers and it makes cars drive

themselves. For example, when you're booking a taxi, you're shown how much the trip would cost. Or when you're on the trip, you're shown the path the taxi would take to reach your destination. While booking a ride on Uber, you're always told the amount of time the trip would take and how much it would cost. All of that, is Machine Learning! The overall goal of this book Machine Learning is to provide a broad understanding of various faces of Machine Learning environment in an integrated manner. It covers the syllabi of all technical universities in India and aboard. The first edition of this book is also been awarded by AICTE and placed in AICTE's latest Model Curriculum in Engineering & Technology as well as Emerging Technology.

Artificial intelligence and the future of warfare James Johnson,2021-09-14 This volume offers an innovative and counter-intuitive study of how and why artificial intelligence-infused weapon systems will affect the strategic stability between nuclear-armed states. Johnson demystifies the hype surrounding artificial intelligence (AI) in the context of nuclear weapons and, more broadly, future warfare. The book highlights the potential, multifaceted intersections of this and other disruptive technology – robotics and autonomy, cyber, drone swarming, big data analytics, and quantum communications – with nuclear stability. Anticipating and preparing for the consequences of the AI-empowered weapon systems are fast becoming a critical task for national security and statecraft. Johnson considers the impact of these trends on deterrence, military escalation, and strategic stability between nuclear-armed states – especially China and the United States. The book draws on a wealth of political and cognitive science, strategic studies, and technical analysis to shed light on the coalescence of developments in AI and other disruptive emerging technologies. Artificial intelligence and the future of warfare sketches a clear picture of the potential impact of AI on the digitized battlefield and broadens our understanding of critical questions for international affairs. AI will profoundly change how wars are fought, and how decision-makers think about nuclear deterrence, escalation management, and strategic stability – but not for the reasons you might think.

International Handbook of AI Law Matthias Artzt,Oliver Belitz,Simon Hembt,Nils Lölfing,2024-12-03 In recent years, the field of Artificial Intelligence (AI) has seen remarkable advances, revolutionizing how we live, work, and interact with technology. As AI systems grow increasingly sophisticated and autonomous, they raise new and challenging legal questions, particularly regarding AI-specific risks associated with automated systems. This indispensable handbook, written in clear language by international experts from all over the world, sheds light on the complex relationship between AI and the law, covering both existing laws and emerging AI-specific legal regulations. Beginning with a comprehensive and insightful technical analysis of how AI works, subsequent chapters cover a wide array of legal fields relevant to AI technology focusing on the legal framework in the EU, including the following topics: the EU AI Act; AI-Specific Liability and Product Safety; Data Protection; Data Law; Intellectual Property; Contracting; Antitrust; Criminal Law; Cybersecurity; Employment Law; and Legal Tech. The book concludes with country reports on the legal and regulatory environment in the United Kingdom, the

United States, China, and Japan, contrasting them with the EU legal framework. Each chapter offers practical advice for implementing legal principles, making the handbook a valuable resource for real-world applications. It is an essential guide for practitioners, policymakers, academics, and others seeking a deep understanding of the complex legal challenges posed by AI use. The handbook aids in responsible and trustworthy AI development and use by guiding decision-making, reducing risks, and protecting the rights and well-being of individuals and society.

Army of None Paul Scharre,2018-04-24 Winner of the 2019 William E. Colby Award The book I had been waiting for. I can't recommend it highly enough. —Bill Gates The era of autonomous weapons has arrived. Today around the globe, at least thirty nations have weapons that can search for and destroy enemy targets all on their own. Paul Scharre, a leading expert in next-generation warfare, describes these and other high tech weapons systems—from Israel's Harpy drone to the American submarine-hunting robot ship Sea Hunter—and examines the legal and ethical issues surrounding their use. "A smart primer to what's to come in warfare" (Bruce Schneier), Army of None engages military history, global policy, and cutting-edge science to explore the implications of giving weapons the freedom to make life and death decisions. A former soldier himself, Scharre argues that we must embrace technology where it can make war more precise and humane, but when the choice is life or death, there is no replacement for the human heart.

Artificial Intelligence for Precision Agriculture Pethuru Raj,N Gayathri,G. Jaspher Willsie Kathrine,2024-12-19 Precision agriculture is a next-generation farming management concept that optimizes resource use, productivity, quality, profitability, and sustainability by observing and responding to crop variability. Precision agriculture employs digital technologies such as the Internet of Things (IoT), artificial intelligence (AI), 5G communication, cybersecurity, edge computing, cloud-native principles, and blockchain to ensure crops and soil receive exactly what they need for optimal health and productivity. Artificial Intelligence for Precision Agriculture explores the latest developments in precision agriculture, detailing how AI contributes to its goals. The book discusses how precision agriculture solutions use IoT devices, data storage, AI analytics, connectivity, and cloud infrastructures to analyze factors such as soil type, terrain, weather, plant growth, and yield data. It also examines edge technologies—sensors, microchips, beacons, RFID tags, robots, drones, and actuators—that collect field data and transmit it to cloud-based AI platforms for analysis. The book shows how AI-driven insights guide actions in the field, such as crop rotation, optimal planting and harvesting times, and soil management, and help farmers apply the right amounts of water, fertilizers, and pesticides, reducing waste and environmental impact. Applications covered in the book include: Drone-based high-resolution field mapping Tracking crops Crop yield assessments Data collection for irrigation, fertilization, and crop management Advanced weather monitoring Equipment management With chapters on AI model development, plant disease detection and remediation, sustainable farming techniques, data integration, AI-enabled data analytics, and knowledge visualization, this book is a comprehensive guide to technologies and

applications in precision agriculture.

Mind Mapping and Artificial Intelligence Jose Maria Guerrero,2022-10-22 In the near future, we will see an increase in the development and use of all sorts of AI applications. Some of the more promising areas will be Finance, Healthcare, IoT, Manufacturing, Journalism, and Cybersecurity. Many of these applications generate a great amount of complex information. Natural Language Understanding is one of the most clear examples. Traditional ways of visualizing complex information, namely linear text, web pages and hyperlink-based applications, have serious productivity problems. Users need a lot of time to visualize the information and have problems seeing the whole picture of the results. Mind mapping is probably the only way of reducing the problems inherent in these traditional ways of visualizing complex information. Most people have no clear idea about the advantages of mind mapping or the problems created by the traditional ways of visualizing complex information. The goal of Mind Mapping and Artificial Intelligence is to provide readers with an introduction to mind mapping and artificial intelligence, to the problems of using traditional ways of visualizing complex information and as an introduction to mind mapping automation and its integration into Artificial Intelligence applications such as NLU and others. As more applications of Artificial Intelligence are developed in the near future, the need for the improvement of the visualization of the information generated will increase exponentially. Information overload will soon also happen in AI applications. This will diminish the advantages of using AI. Author José Maria Guerrero is a long-time expert in mind mapping and visualization techniques. In this book he also introduces readers to MindManager mind mapping software, which can considerably reduce the problems associated with the interpretation of complex information generated by Artificial Intelligence software. - Provides coverage of the fundamentals of mind mapping and visualization applied to Artificial Intelligence applications - Includes coverage of the scientific bases for mind mapping for the visualization of complex information - Introduces MindManager software for mind mapping - Introduces the author's MindManager toolkit for the readers to use in development of new mind mapping applications - Includes case studies and real-world applications of MindManager for AI applications, including examples using IBM Watson NLU

AI and the Bomb James Johnson,2023-01-24 Will AI make accidental nuclear war more likely? If so, how might these risks be reduced? AI and the Bomb provides a coherent, innovative, and multidisciplinary examination of the potential effects of AI technology on nuclear strategy and escalation risk. It addresses a gap in the international relations and strategic studies literature, and its findings have significant theoretical and policy ramifications for using AI technology in the nuclear enterprise. The book advances an innovative theoretical framework to consider AI technology and atomic risk, drawing on insights from political psychology, neuroscience, computer science, and strategic studies. In this multidisciplinary work, James Johnson unpacks the seminal cognitive-psychological features of the Cold War-era scholarship, and offers a novel explanation of why these matter for AI applications and strategic thinking. The study offers crucial insights for policymakers

and contributes to the literature that examines the impact of military force and technological change.

Driving Intelligence: The Green Book J. Mark Bishop,Gabriel Seiberth,2025-12-24 Driving Intelligence takes a critical and captivating tour of autonomous driving, a phenomenon at the intersection of data-driven platforms, artificial (general) intelligence and the mind. The journey extends from Europe to key areas such as Japan, China, and the US, recognizing the global impact of AI & autonomous driving on high-tech and automotive sectors. The significance of 'Driving Intelligence' resonates beyond specialized circles, encompassing a spectrum of perspectives – historical, economic, scientific, and philosophical. The book addresses the pressing question of success probabilities and socioeconomic impacts, not just for specialists but for a wider audience keen on understanding the evolution of AI and mobility in the 21st century. Avoiding partial insights into this domain, the book provides a comprehensive and multifaceted overview which will appeal to a diverse audience including business leaders and policymakers in the mobility and tech industries, governmental bodies, and the general public globally.

Deep Learning By Example Ahmed Menshawy,2018-02-28 Grasp the fundamental concepts of deep learning using Tensorflow in a hands-on manner Key Features Get a first-hand experience of the deep learning concepts and techniques with this easy-to-follow guide Train different types of neural networks using Tensorflow for real-world problems in language processing, computer vision, transfer learning, and more Designed for those who believe in the concept of 'learn by doing', this book is a perfect blend of theory and code examples Book Description Deep learning is a popular subset of machine learning, and it allows you to build complex models that are faster and give more accurate predictions. This book is your companion to take your first steps into the world of deep learning, with hands-on examples to boost your understanding of the topic. This book starts with a quick overview of the essential concepts of data science and machine learning which are required to get started with deep learning. It introduces you to Tensorflow, the most widely used machine learning library for training deep learning models. You will then work on your first deep learning problem by training a deep feed-forward neural network for digit classification, and move on to tackle other real-world problems in computer vision, language processing, sentiment analysis, and more. Advanced deep learning models such as generative adversarial networks and their applications are also covered in this book. By the end of this book, you will have a solid understanding of all the essential concepts in deep learning. With the help of the examples and code provided in this book, you will be equipped to train your own deep learning models with more confidence. What you will learn Understand the fundamentals of deep learning and how it is different from machine learning Get familiarized with Tensorflow, one of the most popular libraries for advanced machine learning Increase the predictive power of your model using feature engineering Understand the basics of deep learning by solving a digit classification problem of MNIST Demonstrate face generation based on the CelebA database, a promising application of generative models Apply deep learning to other domains like language modeling, sentiment analysis, and machine translation

Who this book is for This book targets data scientists and machine learning developers who wish to get started with deep learning. If you know what deep learning is but are not quite sure of how to use it, this book will help you as well. An understanding of statistics and data science concepts is required. Some familiarity with Python programming will also be beneficial.

Introduction to Deep Learning Sandro Skansi,2018-02-04 This textbook presents a concise, accessible and engaging first introduction to deep learning, offering a wide range of connectionist models which represent the current state-of-the-art. The text explores the most popular algorithms and architectures in a simple and intuitive style, explaining the mathematical derivations in a step-by-step manner. The content coverage includes convolutional networks, LSTMs, Word2vec, RBMs, DBNs, neural Turing machines, memory networks and autoencoders. Numerous examples in working Python code are provided throughout the book, and the code is also supplied separately at an accompanying website. Topics and features: introduces the fundamentals of machine learning, and the mathematical and computational prerequisites for deep learning; discusses feed-forward neural networks, and explores the modifications to these which can be applied to any neural network; examines convolutional neural networks, and the recurrent connections to a feed-forward neural network; describes the notion of distributed representations, the concept of the autoencoder, and the ideas behind language processing with deep learning; presents a brief history of artificial intelligence and neural networks, and reviews interesting open research problems in deep learning and connectionism. This clearly written and lively primer on deep learning is essential reading for graduate and advanced undergraduate students of computer science, cognitive science and mathematics, as well as fields such as linguistics, logic, philosophy, and psychology.

Deep Learning: Algorithms and Applications Witold Pedrycz,Shyi-Ming Chen,2019-10-23 This book presents a wealth of deep-learning algorithms and demonstrates their design process. It also highlights the need for a prudent alignment with the essential characteristics of the nature of learning encountered in the practical problems being tackled. Intended for readers interested in acquiring practical knowledge of analysis, design, and deployment of deep learning solutions to real-world problems, it covers a wide range of the paradigm's algorithms and their applications in diverse areas including imaging, seismic tomography, smart grids, surveillance and security, and health care, among others. Featuring systematic and comprehensive discussions on the development processes, their evaluation, and relevance, the book offers insights into fundamental design strategies for algorithms of deep learning.

Deep Learning For Dummies John Paul Mueller,Luca Massaron,2019-04-17 Take a deep dive into deep learning Deep learning provides the means for discerning patterns in the data that drive online business and social media outlets. Deep Learning for Dummies gives you the information you need to take the mystery out of the topic—and all of the underlying technologies associated with it. In no time, you'll make sense of those increasingly confusing algorithms, and find a simple

and safe environment to experiment with deep learning. The book develops a sense of precisely what deep learning can do at a high level and then provides examples of the major deep learning application types. Includes sample code Provides real-world examples within the approachable text Offers hands-on activities to make learning easier Shows you how to use Deep Learning more effectively with the right tools This book is perfect for those who want to better understand the basis of the underlying technologies that we use each and every day.

Generative Deep Learning David Foster,2022-06-28 Generative AI is the hottest topic in tech. This practical book teaches machine learning engineers and data scientists how to use TensorFlow and Keras to create impressive generative deep learning models from scratch, including variational autoencoders (VAEs), generative adversarial networks (GANs), Transformers, normalizing flows, energy-based models, and denoising diffusion models. The book starts with the basics of deep learning and progresses to cutting-edge architectures. Through tips and tricks, you'll understand how to make your models learn more efficiently and become more creative. Discover how VAEs can change facial expressions in photos Train GANs to generate images based on your own dataset Build diffusion models to produce new varieties of flowers Train your own GPT for text generation Learn how large language models like ChatGPT are trained Explore state-of-the-art architectures such as StyleGAN2 and ViT-VQGAN Compose polyphonic music using Transformers and MuseGAN Understand how generative world models can solve reinforcement learning tasks Dive into multimodal models such as DALL.E 2, Imagen, and Stable Diffusion This book also explores the future of generative AI and how individuals and companies can proactively begin to leverage this remarkable new technology to create competitive advantage.

Applied Deep Learning Umberto Michelucci,2018-09-07 Work with advanced topics in deep learning, such as optimization algorithms, hyper-parameter tuning, dropout, and error analysis as well as strategies to address typical problems encountered when training deep neural networks. You'll begin by studying the activation functions mostly with a single neuron (ReLu, sigmoid, and Swish), seeing how to perform linear and logistic regression using TensorFlow, and choosing the right cost function. The next section talks about more complicated neural network architectures with several layers and neurons and explores the problem of random initialization of weights. An entire chapter is dedicated to a complete overview of neural network error analysis, giving examples of solving problems originating from variance, bias, overfitting, and datasets coming from different distributions. Applied Deep Learning also discusses how to implement logistic regression completely from scratch without using any Python library except NumPy, to let you appreciate how libraries such as TensorFlow allow quick and efficient experiments. Case studies for each method are included to put into practice all theoretical information. You'll discover tips and tricks for writing optimized Python code (for example vectorizing loops with NumPy). What You Will Learn Implement advanced techniques in the right way in Python and TensorFlow Debug and optimize advanced methods (such as dropout and regularization) Carry out error analysis (to realize if one has a bias

problem, a variance problem, a data offset problem, and so on) Set up a machine learning project focused on deep learning on a complex dataset Who This Book Is For Readers with a medium understanding of machine learning, linear algebra, calculus, and basic Python programming.

Python Deep Learning Valentino Zocca,Gianmario Spacagna,Daniel Slater,Peter Roelants,2017-04-28 Take your machine learning skills to the next level by mastering Deep Learning concepts and algorithms using Python. About This Book Explore and create intelligent systems using cutting-edge deep learning techniques Implement deep learning algorithms and work with revolutionary libraries in Python Get real-world examples and easy-to-follow tutorials on Theano, TensorFlow, H2O and more Who This Book Is For This book is for Data Science practitioners as well as aspirants who have a basic foundational understanding of Machine Learning concepts and some programming experience with Python. A mathematical background with a conceptual understanding of calculus and statistics is also desired. What You Will Learn Get a practical deep dive into deep learning algorithms Explore deep learning further with Theano, Caffe, Keras, and TensorFlow Learn about two of the most powerful techniques at the core of many practical deep learning implementations: Auto-Encoders and Restricted Boltzmann Machines Dive into Deep Belief Nets and Deep Neural Networks Discover more deep learning algorithms with Dropout and Convolutional Neural Networks Get to know device strategies so you can use deep learning algorithms and libraries in the real world In Detail With an increasing interest in AI around the world, deep learning has attracted a great deal of public attention. Every day, deep learning algorithms are used broadly across different industries. The book will give you all the practical information available on the subject, including the best practices, using real-world use cases. You will learn to recognize and extract information to increase predictive accuracy and optimize results. Starting with a quick recap of important machine learning concepts, the book will delve straight into deep learning principles using Sci-kit learn. Moving ahead, you will learn to use the latest open source libraries such as Theano, Keras, Google's TensorFlow, and H20. Use this guide to uncover the difficulties of pattern recognition, scaling data with greater accuracy and discussing deep learning algorithms and techniques. Whether you want to dive deeper into Deep Learning, or want to investigate how to get more out of this powerful technology, you'll find everything inside. Style and approach Python Machine Learning by example follows practical hands on approach. It walks you through the key elements of Python and its powerful machine learning libraries with the help of real world projects.

Deep Learning David Feldspar,2018-02-26 Big data can tremendously improve a company's performance. Book 1: All organizations, especially larger ones, face this one dilemma: Sorting and reading the big data. Whether it's a business, NGO, or another organization, patterns and numbers need to be understood to keep management as effective as possible. This book solves all kinds of problems that any entrepreneur, accountant, or manager can use. Book 2: Many company owners or accountants don't look at all the numbers, misread the numbers, or don't know how to scale faster and more effectively. Book

3: The lofty expectations about machine learning and deep studies and projects have skyrocketed, and yet, there is so much left to be said about the methods that trigger the higher-functioning corners of the human neural networks. With so many data and investments on the line, how can we deepen our understanding of these subjects? That is where this guide will take you to the next level. It touches on exactly those problems and methods that optimize your financing and comprehension of the little details that often get overlooked. Book 4: The modern-age machines can deepen and quicken our comprehension of numerous areas and fields. Should we come across such enlightening logic, we better take in all the information we can get, especially if our operating in such a field requires such advanced skills. Book 5: Reinforcement learning has to be one of the most prevalent study techniques in artificial intelligence, It is considered to be a computational approach to learning, in which someone makes attempts to capitalize on the total amount of rewards it obtains when cooperating with a multifaceted, inexact setting. Book 6: A fresh perspective from an educated point of view is what will be presented in this elaborate guide. The readers of this hidden gem will discover how agents and the environment are developed and correspond with each other. Book 7: In a time when everyone is trying to advertise online and offline, the meaning people attach to a word can be significant. With all the unstructured data out there, and the guidance we need to take texts apart and look at them from a logical perspective, analyzing skills have become mandatory to any individual working in marketing, text content creation, or otherwise. Book 8: Become more acquainted with the guiding principles of writing in a certain way, understanding language and tone in specific texts, and using existing models to analyze each and every word in relation to each other.

Python Deep Learning Valentino Zocca,Gianmario Spacagna,Daniel Slater,Peter Roelants,2017-04-28 Take your machine learning skills to the next level by mastering Deep Learning concepts and algorithms using Python.About This Book* Explore and create intelligent systems using cutting-edge deep learning techniques* Implement deep learning algorithms and work with revolutionary libraries in Python* Get real-world examples and easy-to-follow tutorials on Theano, TensorFlow, H2O and moreWho This Book Is ForThis book is for Data Science practitioners as well as aspirants who have a basic foundational understanding of Machine Learning concepts and some programming experience with Python. A mathematical background with a conceptual understanding of calculus and statistics is also desired.What You Will Learn* Get a practical deep dive into deep learning algorithms* Explore deep learning further with Theano, Caffe, Keras, and TensorFlow* Learn about two of the most powerful techniques at the core of many practical deep learning implementations: Auto-Encoders and Restricted Boltzmann Machines* Dive into Deep Belief Nets and Deep Neural Networks* Discover more deep learning algorithms with Dropout and Convolutional Neural Networks* Get to know device strategies so you can use deep learning algorithms and libraries in the real worldIn DetailWith an increasing interest in AI around the world, deep learning has attracted a great deal of public attention. Every day, deep learning algorithms are used broadly across different industries.The book will give you all the practical information available on the subject, including the best practices, using real-world use cases. You will learn

to recognize and extract information to increase predictive accuracy and optimize results.Starting with a quick recap of important machine learning concepts, the book will delve straight into deep learning principles using Sci-kit learn. Moving ahead, you will learn to use the latest open source libraries such as Theano, Keras, Google's TensorFlow, and H20. Use this guide to uncover the difficulties of pattern recognition, scaling data with greater accuracy and discussing deep learning algorithms and techniques.Whether you want to dive deeper into Deep Learning, or want to investigate how to get more out of this powerful technology, you'll find everything inside.Style and approachPython Machine Learning by example follows practical hands on approach. It walks you through the key elements of Python and its powerful machine learning libraries with the help of real world projects.

Grokking Deep Learning Andrew Trask,2019-01-25 Summary Grokking Deep Learning teaches you to build deep learning neural networks from scratch! In his engaging style, seasoned deep learning expert Andrew Trask shows you the science under the hood, so you grok for yourself every detail of training neural networks. Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the Technology Deep learning, a branch of artificial intelligence, teaches computers to learn by using neural networks, technology inspired by the human brain. Online text translation, self-driving cars, personalized product recommendations, and virtual voice assistants are just a few of the exciting modern advancements possible thanks to deep learning. About the Book Grokking Deep Learning teaches you to build deep learning neural networks from scratch! In his engaging style, seasoned deep learning expert Andrew Trask shows you the science under the hood, so you grok for yourself every detail of training neural networks. Using only Python and its math-supporting library, NumPy, you'll train your own neural networks to see and understand images, translate text into different languages, and even write like Shakespeare! When you're done, you'll be fully prepared to move on to mastering deep learning frameworks. What's inside The science behind deep learning Building and training your own neural networks Privacy concepts, including federated learning Tips for continuing your pursuit of deep learning About the Reader For readers with high school-level math and intermediate programming skills. About the Author Andrew Trask is a PhD student at Oxford University and a research scientist at DeepMind. Previously, Andrew was a researcher and analytics product manager at Digital Reasoning, where he trained the world's largest artificial neural network and helped guide the analytics roadmap for the Synthesys cognitive computing platform. Table of Contents Introducing deep learning: why you should learn it Fundamental concepts: how do machines learn? Introduction to neural prediction: forward propagation Introduction to neural learning: gradient descent Learning multiple weights at a time: generalizing gradient descent Building your first deep neural network: introduction to backpropagation How to picture neural networks: in your head and on paper Learning signal and ignoring noise:introduction to regularization and batching Modeling probabilities and nonlinearities: activation functions Neural learning about edges and corners: intro to convolutional neural networks Neural networks that understand language:

king - man + woman == ? Neural networks that write like Shakespeare: recurrent layers for variable-length data Introducing automatic optimization: let's build a deep learning framework Learning to write like Shakespeare: long short-term memory Deep learning on unseen data: introducing federated learning Where to go from here: a brief guide

Introduction to Deep Learning Eugene Charniak,2019-02-19 A project-based guide to the basics of deep learning. This concise, project-driven guide to deep learning takes readers through a series of program-writing tasks that introduce them to the use of deep learning in such areas of artificial intelligence as computer vision, natural-language processing, and reinforcement learning. The author, a longtime artificial intelligence researcher specializing in natural-language processing, covers feed-forward neural nets, convolutional neural nets, word embeddings, recurrent neural nets, sequence-to-sequence learning, deep reinforcement learning, unsupervised models, and other fundamental concepts and techniques. Students and practitioners learn the basics of deep learning by working through programs in Tensorflow, an open-source machine learning framework. "I find I learn computer science material best by sitting down and writing programs," the author writes, and the book reflects this approach. Each chapter includes a programming project, exercises, and references for further reading. An early chapter is devoted to Tensorflow and its interface with Python, the widely used programming language. Familiarity with linear algebra, multivariate calculus, and probability and statistics is required, as is a rudimentary knowledge of programming in Python. The book can be used in both undergraduate and graduate courses; practitioners will find it an essential reference.

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