Understanding Deep Convolutional Neural Networks With A

Although interest in machine learning has reached a high point, lofty expectations often scuttle projects before they get very far. How can machine learning—especially deep neural networks—make a real difference in your organization? This hands-on guide not only provides the most practical information available on the subject, but also helps you get started building efficient deep learning networks. Authors Adam Gibson and Josh Patterson provide theory on deep learning before introducing their open-source Deeplearning4j (DL4J) library for developing production-class workflows. Through real-world examples, you'll learn methods and strategies for training deep network architectures and running deep learning workflows on Spark and Hadoop with DL4J. Dive into machine learning concepts in general, as well as deep learning in particular Understand how deep networks evolved from neural network fundamentals Explore the major deep network architectures, including Convolutional and Recurrent Learn how to map specific deep networks to the right problem Walk through the fundamentals of tuning general neural networks and specific deep network architectures Use vectorization techniques for different data types with DataVec, DL4J's workflow tool Learn how to use DL4J natively on Spark and Hadoop

The six volume set LNCS 10634, LNCS 10635, LNCS 10636, LNCS 10637, LNCS 10638, and LNCS 10639 constituts the proceedings of the 24rd International Conference on Neural Information Processing, ICONIP 2017, held in Guangzhou, China, in November 2017. The 563 full papers presented were carefully reviewed and selected from 856 submissions. The 6 volumes are organized in topical sections on Machine Learning, Reinforcement Learning, Big Data Analysis, Deep Learning, Brain-Computer Interface, Computational Finance, Computer Vision, Neurodynamics, Sensory Perception and Decision Making, Computational Intelligence, Neural Data Analysis, Biomedical Engineering, Emotion and Bayesian Networks, Data Mining, Time-Series Analysis, Social Networks, Bioinformatics, Information Security and Social Cognition, Robotics and Control, Pattern Recognition, Neuromorphic Hardware and Speech Processing.

With the recent advances in remote sensing technologies for Earth observation, many different remote sensors are collecting data with distinctive properties. The obtained data are so large and complex that analyzing them manually becomes impractical or even impossible. Therefore, understanding remote sensing images effectively, in connection with physics, has been the primary concern of the remote sensing research community in recent years. For this purpose, machine learning is thought to be a promising technique because it can make the system learn to improve itself. With this distinctive characteristic, the algorithms will be more adaptive, automatic, and intelligent. This book introduces some of the most challenging issues of machine learning in the field of remote sensing, and the latest advanced technologies developed for different applications. It integrates with multi-source/multi-temporal/multi-scale data, and mainly focuses on learning to understand remote sensing images. Particularly, it presents many more effective techniques based on the popular concepts of deep learning and big data to reach new heights of data understanding. Through reporting recent advances in the machine learning approaches towards analyzing and understanding remote sensing images, this book can help readers become more familiar with knowledge frontier and foster an increased interest in this field.

Intelligent prediction and decision support systems are based on signal processing, computer vision (CV), machine learning (ML), software engineering (SE), knowledge based systems (KBS), data mining, artificial intelligence (AI) and include several systems developed from the study of expert systems (ES), genetic algorithms (GA), artificial neural networks (ANN) and fuzzy-logic systems The use of automatic decision support systems in design and manufacturing industry, healthcare and commercial software development systems has the following benifits: Cost savings in companies, due to employment of expert system technology. Fast decision making, completion of projects in time and development of new products. Improvement in decision making capability and quality. Usage of Knowledge database and Preservation of expertise of individuals Eases complex decision problems. Ex: Diagnosis in Healthcare To address the issues and challenges related to development, implementation and application of automatic and intelligent prediction and decision support systems in domains such as manufacturing, healthcare and software product design, development and optimization, this book aims to collect and publish wide ranges of quality articles such as original research contributions, methodological reviews, survey papers, case studies and/or reports covering intelligent systems, expert prediction systems, evaluation models, decision support systems and Computer Aided Diagnosis (CAD).

As deep neural networks (DNNs) become increasingly common in real-world applications, the potential to deliberately "fool" them with data that wouldn't trick a human presents a new attack vector. This practical book examines real-world scenarios where DNNs—the algorithms intrinsic to much of AI—are used daily to process image, audio, and video data. Author Katy Warr considers attack motivations, the risks posed by this adversarial input, and methods for increasing AI robustness to these attacks. If you're a data scientist developing DNN algorithms, a security architect interested in how to make AI systems more resilient to attack, or someone fascinated by the differences between artificial and biological perception, this book is for you. Delve into DNNs and discover how they could be tricked by adversarial input Investigate methods used to generate adversarial input capable of fooling DNNs Explore real-world scenarios and model the adversarial threat Evaluate neural network robustness; learn methods to increase resilience of AI systems to adversarial data Examine some ways in which AI might become better at mimicking human perception in years to come

"We finally have the definitive treatise on PyTorch! It covers the basics and abstractions in great detail. I hope this book becomes your extended reference document." —Soumith Chintala, co-creator of PyTorch Key Features Written by PyTorch's creator and key contributors Develop deep learning models in a familiar Pythonic way Use PyTorch to build an image classifier for cancer detection Diagnose problems with your neural network and improve training with data augmentation Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About The Book Every other day we hear about new ways to put deep learning to good use: improved

medical imaging, accurate credit card fraud detection, long range weather forecasting, and more. PyTorch puts these superpowers in your hands. Instantly familiar to anyone who knows Python data tools like NumPy and Scikit-learn, PyTorch simplifies deep learning without sacrificing advanced features. It's great for building quick models, and it scales smoothly from laptop to enterprise. Deep Learning with PyTorch teaches you to create deep learning and neural network systems with PyTorch. This practical book gets you to work right away building a tumor image classifier from scratch. After covering the basics, you'll learn best practices for the entire deep learning pipeline, tackling advanced projects as your PyTorch skills become more sophisticated. All code samples are easy to explore in downloadable Jupyter notebooks. What You Will Learn Understanding deep learning data structures such as tensors and neural networks Best practices for the PyTorch Tensor API, loading data in Python, and visualizing results Implementing modules and loss functions Utilizing pretrained models from PyTorch Hub Methods for training networks with limited inputs Sifting through unreliable results to diagnose and fix problems in your neural network Improve your results with augmented data, better model architecture, and fine tuning This Book Is Written For For Python programmers with an interest in machine learning. No experience with PyTorch or other deep learning frameworks is required. About The Authors Eli Stevens has worked in Silicon Valley for the past 15 years as a software engineer, and the past 7 years as Chief Technical Officer of a startup making medical device software. Luca Antiga is co-founder and CEO of an AI engineering company located in Bergamo, Italy, and a regular contributor to PyTorch. Thomas Viehmann is a Machine Learning and PyTorch speciality trainer and consultant based in Munich, Germany and a PyTorch core developer. Table of Contents PART 1 - CORE PYTORCH 1 Introducing deep learning and the PyTorch Library 2 Pretrained networks 3 It starts with a tensor 4 Real-world data representation using tensors 5 The mechanics of learning 6 Using a neural network to fit the data 7 Telling birds from airplanes: Learning from images 8 Using convolutions to generalize PART 2 - LEARNING FROM IMAGES IN THE REAL WORLD: EARLY DETECTION OF LUNG CANCER 9 Using PyTorch to fight cancer 10 Combining data sources into a unified dataset 11 Training a classification model to detect suspected tumors 12 Improving training with metrics and augmentation 13 Using segmentation to find suspected nodules 14 End-to-end nodule analysis, and where to go next PART 3 - DEPLOYMENT 15 Deploying to production

This book presents the proceedings of the 24th European Conference on Artificial Intelligence (ECAI 2020), held in Santiago de Compostela, Spain, from 29 August to 8 September 2020. The conference was postponed from June, and much of it conducted online due to the COVID-19 restrictions. The conference is one of the principal occasions for researchers and practitioners of AI to meet and discuss the latest trends and challenges in all fields of AI and to demonstrate innovative applications and uses of advanced AI technology. The book also includes the proceedings of the 10th Conference on Prestigious Applications of Artificial Intelligence (PAIS 2020) held at the same time. A record number of more than 1,700 submissions was received for ECAI 2020, of which 1,443 were reviewed. Of these, 361 full-papers and 36 highlight papers were accepted (an acceptance rate of 25% for full-papers and 45% for highlight papers). The book is divided into three sections: ECAI full papers; ECAI highlight papers; and PAIS papers. The topics of these papers cover all aspects of AI, including Agent-based and Multi-agent Systems; Computational Intelligence; Constraints and Satisfiability; Games and Virtual Environments; Heuristic Search; Human Aspects in AI; Information Retrieval and Filtering; Knowledge Representation and Reasoning; Machine Learning; Multidisciplinary Topics and Applications; Natural Language Processing; Planning and Scheduling; Robotics; Safe, Explainable, and Trustworthy AI; Semantic Technologies; Uncertainty in AI; and Vision. The book will be of interest to all those whose work involves the use of AI technology.

Conceptualizing deep learning in computer vision applications using PyTorch and Python libraries. KEY FEATURES ? Covers a variety of computer vision projects, including face recognition and object recognition such as Yolo, Faster R-CNN. ? Includes graphical representations and illustrations of neural networks and teaches how to program them. ? Includes deep learning techniques and architectures introduced by Microsoft, Google, and the University of Oxford. DESCRIPTION Elements of Deep Learning for Computer Vision gives a thorough understanding of deep learning and provides highly accurate computer vision solutions while using libraries like PyTorch. This book introduces you to Deep Learning and explains all the concepts required to understand the basic working, development, and tuning of a neural network using Pytorch. The book then addresses the field of computer vision using two libraries, including the Python wrapper/version of OpenCV and PIL. After establishing and understanding both the primary concepts, the book addresses them together by explaining Convolutional Neural Networks(CNNs). CNNs are further elaborated using top industry standards and research to explain how they provide complicated Object Detection in images and videos, while also explaining their evaluation. Towards the end, the book explains how to develop a fully functional object detection model, including its deployment over APIs. By the end of this book, you are well-equipped with the role of deep learning in the field of computer vision along with a guided process to design deep learning solutions. WHAT YOU WILL LEARN ? Get to know the mechanism of deep learning and how neural networks operate. ? Learn to develop a highly accurate neural network model. ? Access to rich Python libraries to address computer vision challenges. ? Build deep learning models using PyTorch and learn how to deploy using the API. ? Learn to develop Object Detection and Face Recognition models along with their deployment. WHO THIS BOOK IS FOR This book is for the readers who aspire to gain a strong fundamental understanding of how to infuse deep learning into computer vision and image processing applications. Readers are expected to have intermediate Python skills. No previous knowledge of PyTorch and Computer Vision is required. TABLE OF CONTENTS 1. An Introduction to Deep Learning 2. Supervised Learning 3. Gradient Descent 4. OpenCV with Python 5. Python Imaging Library and Pillow 6. Introduction to Convolutional Neural Networks 7. GoogLeNet, VGGNet, and ResNet 8. Understanding Object Detection 9. Popular Algorithms for Object Detection 10. Faster RCNN with PyTorch and YoloV4 with Darknet 11. Comparing Algorithms and API Deployment with Flask 12.

Applications in Real World

One stop guide to implementing award-winning, and cutting-edge CNN architectures Key Features Fast-paced guide with use cases and real-world examples to get well versed with CNN techniques Implement CNN models on image classification, transfer learning, Object Detection, Instance Segmentation, GANs and more Implement powerful use-cases like image captioning, reinforcement learning for hard attention, and recurrent attention models Book Description Convolutional Neural Network (CNN) is revolutionizing several application domains such as visual recognition systems, self-driving cars, medical discoveries, innovative eCommerce and more.You will learn to create innovative solutions around image and video analytics to solve complex machine learning and computer vision related problems and implement real-life CNN models. This book starts with an overview of deep neural networkswith the example of image classification and walks you through building your first CNN for human face detector. We will learn to use concepts like transfer learning with CNN, and Auto-Encoders to build very powerful models, even when not much of supervised training data of labeled images is available. Later we build upon the learning achieved to build advanced vision related algorithms for object detection, instance segmentation, generative adversarial networks, image captioning, attention mechanisms for vision, and recurrent models for vision. By the end of this book, you should be ready to implement advanced, effective and efficient CNN models at your professional project or personal initiatives by working on complex image and video datasets. What you will learn From CNN basic building blocks to advanced concepts understand practical areas they can be applied to Build an image classifier CNN model to understand how different components interact with each other, and then learn how to optimize it Learn different algorithms that can be applied to Object Detection, and Instance Segmentation Learn advanced concepts like attention mechanisms for CNN to improve prediction accuracy Understand transfer learning and implement award-winning CNN architectures like AlexNet, VGG, GoogLeNet, ResNet and more Understand the working of generative adversarial networks and how it can create new, unseen images Who this book is for This book is for data scientists, machine learning and deep learning practitioners, Cognitive and Artificial Intelligence enthusiasts who want to move one step further in building Convolutional Neural Networks. Get hands-on experience with extreme datasets and different CNN architectures to build efficient and smart ConvNet models. Basic knowledge of deep learning concepts and Python programming language is expected.

How does the computer learn to understand what it sees? Deep Learning for Vision Systems answers that by applying deep learning to computer vision. Using only high school algebra, this book illuminates the concepts behind visual intuition. You'll understand how to use deep learning architectures to build vision system applications for image generation and facial recognition. Summary Computer vision is central to many leading-edge innovations, including self-driving cars, drones, augmented reality, facial recognition, and much, much more. Amazing new computer vision applications are developed every day, thanks to rapid advances in AI and deep learning (DL). Deep Learning for Vision Systems teaches you the concepts and tools for building intelligent, scalable computer vision systems that can identify and react to objects in images, videos, and real life. With author Mohamed Elgendy's expert instruction and illustration of real-world projects, you'll finally grok state-of-the-art deep learning techniques, so you can build, contribute to, and lead in the exciting realm of computer vision! Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About the technology How much has computer vision advanced? One ride in a Tesla is the only answer you'll need. Deep learning techniques have led to exciting breakthroughs in facial recognition, interactive simulations, and medical imaging, but nothing beats seeing a car respond to real-world stimuli while speeding down the highway. About the book How does the computer learn to understand what it sees? Deep Learning for Vision Systems answers that by applying deep learning to computer vision. Using only high school algebra, this book illuminates the concepts behind visual intuition. You'll understand how to use deep learning architectures to build vision system applications for image generation and facial recognition. What's inside Image classification and object detection Advanced deep learning architectures Transfer learning and generative adversarial networks DeepDream and neural style transfer Visual embeddings and image search About the reader For intermediate Python programmers. About the author Mohamed Elgendy is the VP of Engineering at Rakuten. A seasoned AI expert, he has previously built and managed AI products at Amazon and Twilio. Table of Contents PART 1 - DEEP LEARNING FOUNDATION 1 Welcome to computer vision 2 Deep learning and neural networks 3 Convolutional neural networks 4 Structuring DL projects and hyperparameter tuning PART 2 - IMAGE CLASSIFICATION AND DETECTION 5 Advanced CNN architectures 6 Transfer learning 7 Object detection with R-CNN, SSD, and YOLO PART 3 - GENERATIVE MODELS AND VISUAL EMBEDDINGS 8 Generative adversarial networks (GANs) 9 DeepDream and neural style transfer 10 Visual embeddings Step-by-step tutorials on deep learning neural networks for computer vision in python with Keras.

This book constitutes the post-conference proceedings of the 5th International Conference on Machine Learning, Optimization, and Data Science, LOD 2019, held in Siena, Italy, in September 2019. The 54 full papers presented were carefully reviewed and selected from 158 submissions. The papers cover topics in the field of machine learning, artificial intelligence, reinforcement learning, computational optimization and data science presenting a substantial array of ideas, technologies, algorithms, methods and applications.

This must-read text/reference introduces the fundamental concepts of convolutional neural networks (ConvNets), offering practical guidance on using libraries to implement ConvNets in applications of traffic sign detection and classification. The work presents techniques for optimizing the computational efficiency of ConvNets, as well as visualization techniques to better understand the underlying processes. The proposed models are also thoroughly evaluated from different perspectives, using exploratory and quantitative analysis. Topics and features: explains the fundamental concepts behind training linear classifiers and feature learning; discusses the wide range of loss functions for training binary and multi-class classifiers; illustrates how to derive ConvNets from fully connected neural networks, and reviews different

techniques for evaluating neural networks; presents a practical library for implementing ConvNets, explaining how to use a Python interface for the library to create and assess neural networks; describes two real-world examples of the detection and classification of traffic signs using deep learning methods; examines a range of varied techniques for visualizing neural networks, using a Python interface; provides self-study exercises at the end of each chapter, in addition to a helpful glossary, with relevant Python scripts supplied at an associated website. This self-contained guide will benefit those who seek to both understand the theory behind deep learning, and to gain hands-on experience in implementing ConvNets in practice. As no prior background knowledge in the field is required to follow the material, the book is ideal for all students of computer vision and machine learning, and will also be of great interest to practitioners working on autonomous cars and advanced driver assistance systems.

This book covers the fundamentals in designing and deploying techniques using deep architectures. It is intended to serve as a beginner's guide to engineers or students who want to have a quick start on learning and/or building deep learning systems. This book provides a good theoretical and practical understanding and a complete toolkit of basic information and knowledge required to understand and build convolutional neural networks (CNN) from scratch. The book focuses explicitly on convolutional neural networks, filtering out other material that co-occur in many deep learning books on CNN topics.

Principles and Labs for Deep Learning provides the knowledge and techniques needed to help readers design and develop deep learning models. Deep Learning techniques are introduced through theory, comprehensively illustrated, explained through the TensorFlow source code examples, and analyzed through the visualization of results. The structured methods and labs provided by Dr. Huang and Dr. Le enable readers to become proficient in TensorFlow to build deep Convolutional Neural Networks (CNNs) through custom APIs, high-level Keras APIs, Keras Applications, and TensorFlow Hub. Each chapter has one corresponding Lab with step-by-step instruction to help the reader practice and accomplish a specific learning outcome. Deep Learning has been successfully applied in diverse fields such as computer vision, audio processing, robotics, natural language processing, bioinformatics and chemistry. Because of the huge scope of knowledge in Deep Learning, a lot of time is required to understand and deploy useful, working applications, hence the importance of this new resource. Both theory lessons and experiments are included in each chapter to introduce the techniques and provide source code examples to practice using them. All Labs for this book are placed on GitHub to facilitate the download. The book is written based on the assumption that the reader knows basic Python for programming and basic Machine Learning. Introduces readers to the usefulness of neural networks and Deep Learning methods Provides readers with in-depth understanding of the architecture and operation of Deep Convolutional Neural Networks Demonstrates the visualization needed for designing neural networks Provides readers with an in-depth understanding of regression problems, binary classification problems, multi-category classification problems, Variational Auto-Encoder, Generative Adversarial Network, and Object detection

This book provides a structured treatment of the key principles and techniques for enabling efficient processing of deep neural networks (DNNs). DNNs are currently widely used for many artificial intelligence (AI) applications, including computer vision, speech recognition, and robotics. While DNNs deliver state-of-the-art accuracy on many AI tasks, it comes at the cost of high computational complexity. Therefore, techniques that enable efficient processing of deep neural networks to improve key metrics—such as energy-efficiency, throughput, and latency—without sacrificing accuracy or increasing hardware costs are critical to enabling the wide deployment of DNNs in AI systems. The book includes background on DNN processing; a description and taxonomy of hardware architectural approaches for designing DNN accelerators; key metrics for evaluating and comparing different designs; features of DNN processing that are amenable to hardware/algorithm co-design to improve energy efficiency and throughput; and opportunities for applying new technologies. Readers will find a structured introduction to the field as well as formalization and organization of key concepts from contemporary work that provide insights that may spark new ideas.

A Guide to Convolutional Neural Networks for Computer VisionMorgan & Claypool Publishers

This book reviews the state of the art in deep learning approaches to high-performance robust disease detection, robust and accurate organ segmentation in medical image computing (radiological and pathological imaging modalities), and the construction and mining of large-scale radiology databases. It particularly focuses on the application of convolutional neural networks, and on recurrent neural networks like LSTM, using numerous practical examples to complement the theory. The book's chief features are as follows: It highlights how deep neural networks can be used to address new questions and protocols, and to tackle current challenges in medical image computing; presents a comprehensive review of the latest research and literature; and describes a range of different methods that employ deep learning for object or landmark detection tasks in 2D and 3D medical imaging. In addition, the book examines a broad selection of techniques for semantic segmentation using deep learning principles in medical imaging; introduces a novel approach to text and image deep embedding for a large-scale chest x-ray image database; and discusses how deep learning relational graphs can be used to organize a sizable collection of radiology findings from real clinical practice, allowing semantic similarity-based retrieval. The intended reader of this edited book is a professional engineer, scientist or a graduate student who is able to comprehend general concepts of image processing, computer vision and medical image analysis. They can apply computer science and mathematical principles into problem solving practices. It may be necessary to have a certain level of familiarity with a number of more advanced subjects: image formation and enhancement, image understanding, visual recognition in medical applications, statistical learning, deep neural networks, structured prediction and image segmentation.

Get to grips with the basics of Keras to implement fast and efficient deep-learning models About This Book Implement various deep-learning algorithms in Keras and see how deep-learning can be used in games See how various deep-learning models and practical use-cases can be implemented using Keras A practical, hands-on guide with real-world examples to give you a strong foundation in Keras Who This Book Is For If you are a data scientist with experience in machine learning or an AI programmer with some exposure to neural networks, you will find this book a useful entry point to deep-learning with Keras. A knowledge of Python is required for this book. What You Will Learn Optimize step-by-step functions on a large neural network using the Backpropagation Algorithm Fine-tune a neural network to improve the quality of results Use deep learning for image and audio processing Use Recursive Neural Tensor Networks (RNTNs) to outperform standard word embedding in special cases Identify problems for which Recurrent Neural Network (RNN) solutions are suitable Explore the process required

to implement Autoencoders Evolve a deep neural network using reinforcement learning In Detail This book starts by introducing you to supervised learning algorithms such as simple linear regression, the classical multilayer perceptron and more sophisticated deep convolutional networks. You will also explore image processing with recognition of hand written digit images, classification of images into different categories, and advanced objects recognition with related image annotations. An example of identification of salient points for face detection is also provided. Next you will be introduced to Recurrent Networks, which are optimized for processing sequence data such as text, audio or time series. Following that, you will learn about unsupervised learning algorithms such as Autoencoders and the very popular Generative Adversarial Networks (GAN). You will also explore non-traditional uses of neural networks as Style Transfer. Finally, you will look at Reinforcement Learning and its application to AI game playing, another popular direction of research and application of neural networks. Style and approach This book is an easy-to-follow guide full of examples and real-world applications to help you gain an in-depth understanding of Keras. This book will showcase more than twenty working Deep Neural Networks coded in Python using Keras.

Deep Learning with R introduces deep learning and neural networks using the R programming language. The book builds on the understanding of the theoretical and mathematical constructs and enables the reader to create applications on computer vision, natural language processing and transfer learning. The book starts with an introduction to machine learning and moves on to describe the basic architecture, different activation functions, forward propagation, cross-entropy loss and backward propagation of a simple neural network. It goes on to create different code segments to construct deep neural networks. It discusses in detail the initialization of network parameters, optimization techniques, and some of the common issues surrounding neural networks such as dealing with NaNs and the vanishing/exploding gradient problem. Advanced variants of multilayered perceptrons namely, convolutional neural networks and sequence models are explained, followed by application to different use cases. The book makes extensive use of the Keras and TensorFlow frameworks.

This book doesn't have any superpowers or magic formula to help you master the art of neural networks and deep learning. We believe that such learning is all in your heart. You need to learn a concept by heart and then brainstorm its different possibilities. I don't claim that after reading this book you will become an expert in Python and Deep Learning Neural Networks. Instead, you will, for sure, have a basic understanding of deep learning and its implications and real-life applications. Most of the time, what confuses us is the application of a certain thing in our lives. Once we know that, we can relate the subject to that particular thing and learn. An interesting thing is that neural networks also learn the same way. This makes it easier to learn about them when we know the basics. Let's take a look at what this book has to offer: ? The basics of Python including data types, operators and numbers. ? Advanced programming in Python with Python expressions, types and much more. ? A comprehensive overview of deep learning and its link to the smart systems that we are now building. ? An overview of how artificial neural networks work in real life. ? An overview of PyTorch. ? An overview of TensorFlow. ? An overview of Keras. ? How to create a convolutional neural network. ? A comprehensive understanding of deep learning applications and its ethical implications, including in the present and future. This book offers you the basic knowledge about Python and Deep Learning Neural Networks that you will need to lay the foundation for future studies. This book will start you on the road to mastering the art of deep learning neural networks. When I say that I don't have the magic formula to make you learn, I mean it. My point is that you should learn Python coding and Python libraries to build neural networks by practicing hard. The more you practice, the better it is for your skills. It is only after thorough and in depth practice that you will be able to create your own programs. Unlike other books, I don't claim that this book will make you a master of deep learning after a single read. That's not realistic, in fact, it's even a bit absurd. What I claim is that you will definitely learn about the basics. The rest is practice. The more you practice the better you code.

Think of deep learning as an art of cooking. One way to cook is to follow a recipe. But when we learn how the food, the spices, and the fire behave, we make our creation. And an understanding of the "how" transcends the creation. Likewise, an understanding of the "how" transcends deep learning. In this spirit, this book presents the deep learning constructs, their fundamentals, and how they behave. Baseline models are developed alongside, and concepts to improve them are exemplified.Topics covered in the book include:- Multilayer Perceptrons- Long- and short-term Memory Networks- Convolutional Neural Networks- AutoencodersEvery topic is thoroughly explained and illustrated graphically. Moreover, implementations in TensorFlow are given for developing a complete understanding.

Build, implement and scale distributed deep learning models for large-scale datasets About This Book Get to grips with the deep learning concepts and set up Hadoop to put them to use Implement and parallelize deep learning models on Hadoop's YARN framework A comprehensive tutorial to distributed deep learning with Hadoop Who This Book Is For If you are a data scientist who wants to learn how to perform deep learning on Hadoop, this is the book for you. Knowledge of the basic machine learning concepts and some understanding of Hadoop is required to make the best use of this book. What You Will Learn Explore Deep Learning and various models associated with it Understand the challenges of implementing distributed deep learning with Hadoop and how to overcome it Implement Convolutional Neural Network (CNN) with deeplearning4j Delve into the implementation of Restricted Boltzmann Machines (RBM) Understand the mathematical explanation for implementing Recurrent Neural Networks (RNN) Get hands on practice of deep learning and their implementation with Hadoop. In Detail This book will teach you how to deploy large-scale dataset in deep neural networks with Hadoop for optimal performance. Starting with understanding what deep learning is, and what the various models associated with deep neural networks are, this book will then show you how to set up the Hadoop environment for deep learning. In this book, you will also learn how to overcome the challenges that you face while implementing distributed deep learning with large-scale unstructured datasets. The book will also show you how you can implement and parallelize the widely used deep learning models such as Deep Belief Networks, Convolutional Neural Networks, Recurrent Neural Networks, Restricted Boltzmann Machines and autoencoder using the popular deep learning library deeplearning4j. Get in-depth mathematical explanations and visual representations to help you understand the design and implementations of Recurrent Neural network and Denoising AutoEncoders with deeplearning4j. To give you a more practical perspective, the book will also teach you the implementation of large-scale video processing, image processing and natural language processing on Hadoop. By the end of this book, you will know how to deploy various deep neural networks in distributed systems using Hadoop. Style and approach This book takes a comprehensive, step-by-step approach to implement efficient deep learning models on Hadoop. It starts from the basics and builds the readers' knowledge as they strengthen their understanding of the concepts. Practical examples are included in every step of the way to supplement the theory.

This book covers both classical and modern models in deep learning. The primary focus is on the theory and algorithms of deep learning. The theory and algorithms of neural networks are particularly important for understanding important concepts, so that one can understand the important design concepts of neural architectures in different applications. Why do neural networks work? When do they work better than off-the-shelf machine-learning models? When is depth useful? Why is training neural networks so hard? What are the pitfalls? The book is also rich in discussing different applications in order to give the practitioner a flavor of how neural architectures are designed for different types of problems. Applications associated with many different areas like recommender systems, machine translation, image captioning, image classification, reinforcement-learning based gaming, and text analytics are covered. The chapters of this book span three categories: The basics of neural networks: Many traditional machine learning models can be understood as special cases of neural networks. An emphasis is placed in the first two chapters on understanding the relationship between traditional machine learning and neural networks. Support vector machines, linear/logistic regression, singular value decomposition, matrix factorization, and recommender systems are shown to be special cases of neural networks. These methods are studied together with recent feature engineering methods like word2vec. Fundamentals of

neural networks: A detailed discussion of training and regularization is provided in Chapters 3 and 4. Chapters 5 and 6 present radial-basis function (RBF) networks and restricted Boltzmann machines. Advanced topics in neural networks: Chapters 7 and 8 discuss recurrent neural networks and convolutional neural networks. Several advanced topics like deep reinforcement learning, neural Turing machines, Kohonen self-organizing maps, and generative adversarial networks are introduced in Chapters 9 and 10. The book is written for graduate students, researchers, and practitioners. Numerous exercises are available along with a solution manual to aid in classroom teaching. Where possible, an application-centric view is highlighted in order to provide an understanding of the practical uses of each class of techniques.

Learn how to solve challenging machine learning problems with TensorFlow, Google's revolutionary new software library for deep learning. If you have some background in basic linear algebra and calculus, this practical book introduces machine-learning fundamentals by showing you how to design systems capable of detecting objects in images, understanding text, analyzing video, and predicting the properties of potential medicines. TensorFlow for Deep Learning teaches concepts through practical examples and helps you build knowledge of deep learning foundations from the ground up. It's ideal for practicing developers with experience designing software systems, and useful for scientists and other professionals familiar with scripting but not necessarily with designing learning algorithms. Learn TensorFlow fundamentals, including how to perform basic computation Build simple learning systems to understand their mathematical foundations Dive into fully connected deep networks used in thousands of applications Turn prototypes into high-quality models with hyperparameter optimization Process images with convolutional neural networks Handle natural language datasets with recurrent neural networks Use reinforcement learning to solve games such as tic-tac-toe Train deep networks with hardware including GPUs and tensor processing units

The development of "intelligent" systems that can take decisions and perform autonomously might lead to faster and more consistent decisions. A limiting factor for a broader adoption of AI technology is the inherent risks that come with giving up human control and oversight to "intelligent" machines. For sensitive tasks involving critical infrastructures and affecting human well-being or health, it is crucial to limit the possibility of improper, non-robust and unsafe decisions and actions. Before deploying an AI system, we see a strong need to validate its behavior, and thus establish guarantees that it will continue to perform as expected when deployed in a real-world environment. In pursuit of that objective, ways for humans to verify the agreement between the AI decision structure and their own ground-truth knowledge have been explored. Explainable AI (XAI) has developed as a subfield of AI, focused on exposing complex AI models to humans in a systematic and interpretable manner. The 22 chapters included in this book provide a timely snapshot of algorithms, theory, and applications of interpretable and explainable AI and AI techniques that have been proposed recently reflecting the current discourse in this field and providing directions of future development. The book is organized in six parts: towards AI transparency; methods for interpreting AI systems; explaining the decisions of AI systems; evaluating interpretability and explanations; applications of explainable AI; and software for explainable AI.

Develop and optimize deep learning models with advanced architectures. This book teaches you the intricate details and subtleties of the algorithms that are at the core of convolutional neural networks. In Advanced Applied Deep Learning, you will study advanced topics on CNN and object detection using Keras and TensorFlow. Along the way, you will look at the fundamental operations in CNN, such as convolution and pooling, and then look at more advanced architectures such as inception networks, resnets, and many more. While the book discusses theoretical topics, you will discover how to work efficiently with Keras with many tricks and tips, including how to customize logging in Keras with custom callback classes, what is eager execution, and how to use it in your models. Finally, you will study how object detection works, and build a complete implementation of the YOLO (you only look once) algorithm in Keras and TensorFlow. By the end of the book you will have implemented various models in Keras and learned many advanced tricks that will bring your skills to the next level. What You Will Learn See how convolutional neural networks and object detection work Save weights and models on disk Pause training and restart it at a later stage Use hardware acceleration (GPUs) in your code Work with the Dataset TensorFlow abstraction and use pre-trained models and transfer learning Remove and add layers to pre-trained networks to adapt them to your specific project Apply pre-trained models such as Alexnet and VGG16 to new datasets Who This Book Is For Scientists and researchers with intermediate-to-advanced Python and machine learning know-how. Additionally, intermediate knowledge of Keras and TensorFlow is expected.

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.

The eight-volume set comprising LNCS volumes 9905-9912 constitutes the refereed proceedings of the 14th European Conference on Computer Vision, ECCV 2016, held in Amsterdam, The Netherlands, in October 2016. The 415 revised

papers presented were carefully reviewed and selected from 1480 submissions. The papers cover all aspects of computer vision and pattern recognition such as 3D computer vision; computational photography, sensing and display; face and gesture; low-level vision and image processing; motion and tracking; optimization methods; physicsbased vision, photometry and shape-from-X; recognition: detection, categorization, indexing, matching; segmentation, grouping and shape representation; statistical methods and learning; video: events, activities and surveillance; applications. They are organized in topical sections on detection, recognition and retrieval; scene understanding; optimization; image and video processing; learning; action activity and tracking; 3D; and 9 poster sessions.

Computer vision has become increasingly important and effective in recent years due to its wide-ranging applications in areas as diverse as smart surveillance and monitoring, health and medicine, sports and recreation, robotics, drones, and self-driving cars. Visual recognition tasks, such as image classification, localization, and detection, are the core building blocks of many of these applications, and recent developments in Convolutional Neural Networks (CNNs) have led to outstanding performance in these state-of-the-art visual recognition tasks and systems. As a result, CNNs now form the crux of deep learning algorithms in computer vision. This self-contained guide will benefit those who seek to both understand the theory behind CNNs and to gain hands-on experience on the application of CNNs in computer vision. It provides a comprehensive introduction to CNNs starting with the essential concepts behind neural networks: training, regularization, and optimization of CNNs. The book also discusses a wide range of loss functions, network layers, and popular CNN architectures, reviews the different techniques for the evaluation of CNNs, and presents some popular CNN tools and libraries that are commonly used in computer vision. Further, this text describes and discusses case studies that are related to the application of CNN in computer vision, including image classification, object detection, semantic segmentation, scene understanding, and image generation. This book is ideal for undergraduate and graduate students, as no prior background knowledge in the field is required to follow the material, as well as new researchers, developers, engineers, and practitioners who are interested in gaining a quick understanding of CNN models.

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.

Design, implement, and deliver successful streaming applications, machine learning pipelines and graph applications using Spark SQL API About This Book Learn about the design and implementation of streaming applications, machine learning pipelines, deep learning, and large-scale graph processing applications using Spark SQL APIs and Scala. Learn data exploration, data munging, and how to process structured and semi-structured data using real-world datasets and gain hands-on exposure to the issues and challenges of working with noisy and "dirty" real-world data. Understand design considerations for scalability and performance in web-scale Spark application architectures. Who This Book Is For If you are a developer, engineer, or an architect and want to learn how to use Apache Spark in a web-scale project, then this is the book for you. It is assumed that you have prior knowledge of SQL querying. A basic programming knowledge with Scala, Java, R, or Python is all you need to get started with this book. What You Will Learn Familiarize yourself with Spark SQL programming, including working with DataFrame/Dataset API and SQL Perform a series of hands-on exercises with different types of data sources, including CSV, JSON, Avro, MySQL, and MongoDB Perform data quality checks, data visualization, and basic statistical analysis tasks Perform data munging tasks on publically available datasets Learn how to use Spark SQL and Apache Kafka to build streaming applications Learn key performance-tuning tips and tricks in Spark SQL applications Learn key architectural components and patterns in large-scale Spark SQL applications In Detail In the past year, Apache Spark has been increasingly adopted for the development of distributed applications. Spark SQL APIs provide an optimized interface that helps developers build such applications quickly and easily. However, designing web-scale production applications using Spark SQL APIs can be a complex task. Hence, understanding the design and implementation best practices before you start your project will help you avoid these problems. This book gives an insight into the engineering practices used to design and build real-world, Spark-based applications. The book's hands-on examples will give you the required confidence to work on any future projects you encounter in Spark SQL. It starts by familiarizing you with data exploration and data munging tasks using Spark SQL and Scala. Extensive code examples will help you understand the methods used to implement typical use-cases for various types of applications. You will get a walkthrough of the key concepts and terms that are common to streaming, machine

learning, and graph applications. You will also learn key performance-tuning details including Cost Based Optimization (Spark 2.2) in Spark SQL applications. Finally, you will move on to learning how such systems are architected and deployed for a successful delivery of your project. Style and approach This book is a hands-on guide to designing, building, and deploying Spark SQL-centric production applications at scale.

Create learning experiences that transform not only learning, but life itself. Learn about, improve, and expand your world of learning. This hands-on companion to the runaway best-seller, Deep Learning: Engage the World Change the World, provides an essential roadmap for building capacity in teachers, schools, districts, and systems to design deep learning, measure progress, and assess conditions needed to activate and sustain innovation. Loaded with tips, tools, protocols, and real-world examples, the easy-to-use guide has everything educators need to construct and drive meaningful deep learning experiences that give purpose, unleash student potential, and prepare students to become problem-solving change agents in a global society.

Learn how to apply TensorFlow to a wide range of deep learning and Machine Learning problems with this practical guide on training CNNs for image classification, image recognition, object detection and many computer vision challenges. Key Features Learn the fundamentals of Convolutional Neural Networks Harness Python and Tensorflow to train CNNs Build scalable deep learning models that can process millions of items Book Description Convolutional Neural Networks (CNN) are one of the most popular architectures used in computer vision apps. This book is an introduction to CNNs through solving real-world problems in deep learning while teaching you their implementation in popular Python library - TensorFlow. By the end of the book, you will be training CNNs in no time! We start with an overview of popular machine learning and deep learning models, and then get you set up with a TensorFlow development environment. This environment is the basis for implementing and training deep learning models in later chapters. Then, you will use Convolutional Neural Networks to work on problems such as image classification, object detection, and semantic segmentation. After that, you will use transfer learning to see how these models can solve other deep learning problems. You will also get a taste of implementing generative models such as autoencoders and generative adversarial networks. Later on, you will see useful tips on machine learning best practices and troubleshooting. Finally, you will learn how to apply your models on large datasets of millions of images. What you will learn Train machine learning models with TensorFlow Create systems that can evolve and scale during their life cycle Use CNNs in image recognition and classification Use TensorFlow for building deep learning models Train popular deep learning models Fine-tune a neural network to improve the quality of results with transfer learning Build TensorFlow models that can scale to large datasets and systems Who this book is for This book is for Software Engineers, Data Scientists, or Machine Learning practitioners who want to use CNNs for solving real-world problems. Knowledge of basic machine learning concepts, linear algebra and Python will help.

Deep Learning - 2 BOOK BUNDLE!! Deep Learning with Keras This book will introduce you to various supervised and unsupervised deep learning algorithms like the multilayer perceptron, linear regression and other more advanced deep convolutional and recurrent neural networks. You will also learn about image processing, handwritten recognition, object recognition and much more. Furthermore, you will get familiar with recurrent neural networks like LSTM and GAN as you explore processing sequence data like time series, text, and audio. The book will definitely be your best companion on this great deep learning journey with Keras introducing you to the basics you need to know in order to take next steps and learn more advanced deep neural networks. Here Is a Preview of What You'll Learn Here… The difference between deep learning and machine learning Deep neural networks Convolutional neural networks Building deep learning models with Keras Multi-layer perceptron network models Activation functions Handwritten recognition using MNIST Solving multi-class classification problems Recurrent neural networks and sequence classification And much more... Convolutional Neural Networks in Python This book covers the basics behind Convolutional Neural Networks by introducing you to this complex world of deep learning and artificial neural networks in a simple and easy to understand way. It is perfect for any beginner out there looking forward to learning more about this machine learning field. This book is all about how to use convolutional neural networks for various image, object and other common classification problems in Python. Here, we also take a deeper look into various Keras layer used for building CNNs we take a look at different activation functions and much more, which will eventually lead you to creating highly accurate models able of performing great task results on various image classification, object classification and other problems. Therefore, at the end of the book, you will have a better insight into this world, thus you will be more than prepared to deal with more complex and challenging tasks on your own. Here Is a Preview of What You'll Learn In This Book… Convolutional neural networks structure How convolutional neural networks actually work Convolutional neural networks applications The importance of convolution operator Different convolutional neural networks layers and their importance Arrangement of spatial parameters How and when to use stride and zero-padding Method of parameter sharing Matrix multiplication and its importance Pooling and dense layers Introducing non-linearity relu activation function How to train your convolutional neural network models using backpropagation How and why to apply dropout CNN model training process How to build a convolutional neural network Generating predictions and calculating loss functions How to train and evaluate your MNIST classifier How to build a simple image classification CNN And much, much more! Get this book bundle NOW and SAVE money!

The seven-volume set comprising LNCS volumes 8689-8695 constitutes the refereed proceedings of the 13th European Conference on Computer Vision, ECCV 2014, held in Zurich, Switzerland, in September 2014. The 363 revised papers presented were carefully reviewed and selected from 1444 submissions. The papers are organized in topical sections on tracking and activity recognition; recognition; learning and inference; structure from motion and feature matching; computational photography and low-level vision; vision; segmentation and saliency; context and 3D scenes; motion and 3D scene analysis; and poster sessions.

Think of deep learning as an art of cooking. One way to cook is to follow a recipe. But when we learn how the food, the spices, and the fire behave, we make our creation. And an understanding of the "how" transcends the creation. Likewise, an understanding of the "how" transcends deep learning. In this spirit, this book presents the deep learning constructs, their fundamentals, and how they behave. Baseline models are developed alongside, and concepts to improve them are exemplified.

This book presents recent advances in nonlinear speech processing beyond nonlinear techniques. It shows that it exploits heuristic and psychological models of human interaction in order to succeed in the implementations of socially believable VUIs and applications for human health and psychological support. The book takes into account the multifunctional role of speech and what is "outside of the box" (see Björn Schuller's foreword). To this aim, the book is organized in 6 sections, each collecting a small number of short chapters reporting advances "inside" and "outside" themes related to nonlinear speech research. The themes

emphasize theoretical and practical issues for modelling socially believable speech interfaces, ranging from efforts to capture the nature of sound changes in linguistic contexts and the timing nature of speech; labors to identify and detect speech features that help in the diagnosis of psychological and neuronal disease, attempts to improve the effectiveness and performance of Voice User Interfaces, new front-end algorithms for the coding/decoding of effective and computationally efficient acoustic and linguistic speech representations, as well as investigations capturing the social nature of speech in signaling personality traits, emotions and improving human machine interactions.