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Bioimage Data Analysis Workflows - Kota Miura 2019-10-17
This Open Access textbook provides students and researchers in the life sciences with essential practical information on how to quantitatively analyze data images. It refrains from focusing on theory, and instead uses practical examples and step-by step protocols to familiarize readers with the most commonly used image processing and analysis platforms such as ImageJ, MatLab and Python. Besides gaining knowhow on algorithm usage, readers will learn how to create an analysis pipeline by scripting language; these skills are important in order to document reproducible image analysis workflows. The textbook is chiefly intended for advanced undergraduates in the life sciences and biomedicine without a theoretical background in data analysis, as well as for postdocs, staff scientists and faculty members who need to perform regular quantitative analyses of microscopy images.

Learning OpenCV 4 Computer Vision with Python 3 - Joseph Howse 2020-02-20
Updated for OpenCV 4 and Python 3, this book covers the latest on depth cameras, 3D tracking, augmented reality, and deep neural networks, helping you solve real-world computer vision problems with practical code Key Features Build powerful computer vision applications in concise code with OpenCV 4 and Python 3 Learn the fundamental concepts of image processing, object classification, and 2D and 3D tracking Train, use, and understand machine learning models such as Support Vector Machines (SVMs) and neural networks Book Description Computer vision is a rapidly evolving science, encompassing diverse applications and techniques. This book will not only help those who are getting started with computer vision but also experts in the domain. You'll be able to put theory into practice by building apps with OpenCV 4 and Python 3. You'll start by understanding OpenCV 4 and how to set it up with Python 3 on various platforms. Next, you'll learn how to perform basic operations such as reading, writing, manipulating, and displaying still images, videos, and camera feeds. From taking you through image processing, video analysis, and depth estimation and segmentation, to helping you gain practice by building a GUI app, this book ensures you'll have opportunities for hands-on activities. Next, you'll tackle two popular challenges: face detection and face recognition. You'll also learn about object classification and machine learning concepts, which will enable you to create and use object detectors and classifiers, and even track objects in movies or video camera feed. Later, you'll develop your skills in 3D tracking and augmented reality. Finally, you'll cover ANNs and DNNs, learning how to develop apps for recognizing handwritten digits and classifying a person's gender and age. By the end of this book, you'll have the skills you need to execute real-world computer vision projects. What you will learn Install and familiarize yourself with OpenCV 4's Python 3 bindings Understand image processing and video analysis basics Use a depth camera to distinguish foreground and background regions Detect and identify objects, and track their motion in videos Train and use your own models to match images and classify objects Detect and recognize faces, and classify their gender and age Build an augmented reality application to track an image in 3D Work with machine learning models, including SVMs, artificial neural networks (ANNs), and deep neural networks (DNNs) Who this book is for If you are interested in learning computer vision, machine learning, and OpenCV in the context of practical real-world applications, then this book is for you. This OpenCV book will also be useful for anyone getting started with computer vision as well as experts who want to stay up-to-date with OpenCV 4 and Python 3. Although no prior knowledge of image processing, computer vision or machine learning is required, familiarity with basic Python programming is a must.

Python Deep Learning - Ivan Vasilev 2019-01-16
Learn advanced state-of-the-art deep learning techniques and their applications using popular Python libraries Key FeaturesBuild a strong foundation in neural networks and deep learning with Python librariesExplore advanced deep learning techniques and their applications across computer vision and NLPLearn how a computer can navigate in complex environments with reinforcement learningBook Description With the surge in artificial intelligence in applications catering to both business and consumer needs, deep learning is more important than ever for meeting current and future market demands. With this book, you'll explore deep learning, and learn how to put machine learning to use in your projects. This second edition of Python Deep Learning will get you up to speed with deep learning, deep neural networks, and how to train them with high-performance algorithms and popular Python frameworks. You'll uncover different neural network architectures, such as convolutional networks, recurrent neural networks, long short-term memory (LSTM) networks, and capsule networks. You'll also learn how to solve problems in the fields of computer vision, natural language processing (NLP), and speech recognition. You'll study generative model approaches such as variational autoencoders and Generative Adversarial Networks (GANs) to generate images. As you delve into newly evolved areas of reinforcement learning, you'll gain an understanding of state-of-the-art algorithms that are the main components behind popular games Go, Atari, and Dota. By the end of the book, you will be well-versed with the theory of deep learning along with its real-world applications. What you will learnGrasp the mathematical theory behind neural networks and deep learning processesInvestigate and resolve computer vision challenges using convolutional networks and capsule networksSolve generative tasks using variational autoencoders and Generative Adversarial NetworksImplement complex NLP tasks using recurrent networks (LSTM and GRU) and attention modelsExplore reinforcement learning and understand how agents behave in a complex environmentGet up to date with applications of deep learning in autonomous vehiclesWho this book is for This book is for data science practitioners, machine learning engineers, and those interested in deep learning who have a basic foundation in machine learning and some Python programming experience. A background in mathematics and conceptual understanding of calculus and statistics will help you gain maximum benefit from this book.

Learning Data Mining with Python - Robert Layton 2015-07-29
The next step in the information age is to gain insights from the deluge of data coming our way. Data mining provides a way of finding this insight, and Python is one of the most popular languages for data mining, providing both power and flexibility in analysis. This book teaches you to design and develop data mining applications using a variety of datasets, starting with basic classification and affinity analysis. Next, we move on to more complex data types including text, images, and graphs. In every chapter, we create models that solve real-world problems. There is a rich and varied set of libraries available in Python for data mining. This book covers a large number, including the IPython Notebook, pandas, scikit-learn and NLTK. Each chapter of this book introduces you to new algorithms and techniques. By the end of the book, you will gain a large insight into using Python for data mining, with a good knowledge and understanding of the algorithms and implementations.

Beyond the Basic Stuff with Python - Al Sweigart 2020-12-16

BRIDGE THE GAP BETWEEN NOVICE AND PROFESSIONAL You've completed a basic Python programming tutorial or finished Al Sweigart's bestseller, Automate the Boring Stuff with Python. What's the next step toward becoming a capable, confident software developer? Welcome to Beyond the Basic Stuff with Python. More than a mere collection of advanced syntax and masterful tips for writing clean code, you'll learn how to advance your Python programming skills by using the command line and other professional tools like code formatters, type checkers, linters, and version control. Sweigart takes you through best practices for setting up your development environment, naming variables, and improving readability, then tackles documentation, organization and performance measurement, as well as object-oriented design and the Big-O algorithm analysis commonly used in coding interviews. The skills you learn will boost your ability to program--not just in Python but in any language. You'll learn: Coding style, and how to use Python's Black auto-formatting tool for cleaner code Common sources of bugs, and how to detect them with static analyzers How to structure the files in your code projects with the Cookiecutter template tool Functional programming techniques like lambda and higher-order functions How to profile the speed of your code with Python's built-in timeit and cProfile modules The computer science behind Big-O algorithm analysis How to make your comments and docstrings informative, and how often to write them How to create classes in object-oriented programming, and why they're used to organize code Toward the end of the book you'll read a detailed source-code breakdown of two classic command-line games, the Tower of Hanoi (a logic puzzle) and Four-in-a-Row (a two-player tile-dropping game), and a breakdown of how their code follows the book's best practices. You'll test your skills by implementing the program yourself. Of course, no single book can make you a professional software developer. But Beyond the Basic Stuff with Python will get you further down that path and make you a better programmer, as you learn to write readable code that's easy to debug and perfectly Pythonic Requirements: Covers Python 3.6 and higher

Intelligent Systems and Applications - Yaxin Bi 2019-08-23
The book presents a remarkable collection of chapters covering a wide range of topics in the areas of intelligent systems and artificial intelligence, and their real-world applications. It gathers the proceedings of the Intelligent Systems Conference 2019, which attracted a total of 546 submissions from pioneering researchers, scientists, industrial engineers, and students from all around the world. These submissions underwent a double-blind peer-review process, after which 190 were selected for inclusion in these proceedings. As intelligent systems continue to replace and sometimes outperform human intelligence in decision-making processes, they have made it possible to tackle a host of problems more effectively. This branching out of computational intelligence in several directions and use of intelligent systems in everyday applications have created the need for an international conference as a venue for reporting on the latest innovations and trends. This book collects both theory and application based chapters on virtually all aspects of artificial intelligence; presenting state-of-the-art intelligent methods and techniques for solving real-world problems, along with a vision for future research, it represents a unique and valuable asset.

Artificial Intelligence and Computer Vision - Huimin Lu 2016-11-01
This edited book presents essential findings in the research fields of artificial intelligence and computer vision, with a primary focus on new research ideas and results for mathematical problems involved in computer vision systems. The book provides an international forum for researchers to summarize the most recent developments and ideas in the field, with a special emphasis on the technical and observational results obtained in the past few years.

Practical Machine Learning with Rust - Joydeep Bhattacharjee 2019-12-10
Explore machine learning in Rust and learn about the intricacies of creating machine learning applications. This book begins by covering the important concepts of machine learning such as supervised, unsupervised, and reinforcement learning, and the basics of Rust. Further, you'll dive into the more specific fields of machine learning, such as computer vision and natural language processing, and look at the Rust libraries that help create applications for those domains. We will also look at how to deploy these applications either on site or over the cloud. After reading Practical Machine Learning with Rust, you will have a solid understanding of creating high computation libraries using Rust. Armed with the knowledge of this amazing language, you will be able to create applications that are more performant, memory safe, and less

resource heavy. What You Will Learn Write machine learning algorithms in RustUse Rust libraries for different tasks in machine learningCreate concise Rust packages for your machine learning applicationsImplement NLP and computer vision in RustDeploy your code in the cloud and on bare metal servers Who This Book Is For Machine learning engineers and software engineers interested in building machine learning applications in Rust.

Arduino Computer Vision Programming - Ozen Ozkaya 2015-08-24
Design and develop real-world computer vision applications with the powerful combination of OpenCV and ArduinoAbout This Book- Load and run the applications in Arduino to develop intelligent systems- Design and implement detection, classification, and recognition algorithms for computer vision applications- Explore the best practices of computer vision development including state of the art algorithms and hands-on example projectsWho This Book Is ForIf you are a consumer and hobbyist who has familiarity with the basics of Arduino and wish to learn computer vision programming with Arduino to create intelligent systems, then this book is for you. No knowledge of computer vision programming is required.What You Will Learn- Understand the design blocks and the generic architecture of computer vision systems by learning an efficient approach to modelling- Build up your skill set of computer vision system design using OpenCV by learning fundamentals, camera selection, data acquisition, filtering, processing, feature extraction and recognition for any specific problem- Learn the wired and wireless communication capabilities of Arduino and comprehensive best practices to connect it to the OpenCV environment in a platform-independent way- Discover how to use Arduino to elegantly interact with real life via physical actions- Solidify everything you've learnt by designing and building a computer vision-enabled practical robot from scratchIn detailsMost technologies are developed with an inspiration of human capabilities. Most of the time, the hardest to implement capability is vision. Development of highly capable computer vision applications in an easy way requires a generic approach. In this approach, Arduino is a perfect tool for interaction with the real world. Moreover, the combination of OpenCV and Arduino boosts the level and quality of practical computer vision applications.Computer vision is the next level of sensing the environment. The purpose of this book is to teach you how to develop Arduino-supported computer vision systems that can interact with real life by seeing it.This book will combine the powers of Arduino and computer vision in a generalized, well-defined, and applicable way. The practices and approaches in the book can be used for any related problems and on any platforms. At the end of the book, you should be able to solve any types of real life vision problems with all its components by using the presented approach. Each component will extend your vision with the best practices on the topic.In each chapter, you will find interesting real life practical application examples about the topics in the chapter. To make it grounded, we will build a vision-enabled robot step by step towards the end of the book. You will observe that, even though the contexts of the problems are very different, the approaches to solve them are the same and very easy!Style and approachThis book is a step-by-step guide that explains each topic sequentially by using best practices and useful tips to build computer-vision applications with OpenCV and Arduino. All the information in the book is combined in a real life all-in-one example application.

Practical Computer Vision with SimpleCV - Kurt Demaagd 2012
SimpleCV is a cross platform (Windows, Macintosh, Linux) framework in Python that makes writing computer vision applications quick and easy.

Machine Learning For Dummies - John Paul Mueller 2021-02-09
One of Mark Cuban's top reads for better understanding A.I. (inc.com, 2021) Your comprehensive entry-level guide to machine learning While machine learning expertise doesn't quite mean you can create your own Turing Test-proof android—as in the movie Ex Machina—it is a form of artificial intelligence and one of the most exciting technological means of identifying opportunities and solving problems fast and on a large scale. Anyone who masters the principles of machine learning is mastering a big part of our tech future and opening up incredible new directions in careers that include fraud detection, optimizing search results, serving real-time ads, credit-scoring, building accurate and sophisticated pricing models—and way, way more. Unlike most machine learning books, the fully updated 2nd Edition of Machine Learning For Dummies doesn't assume you have years of experience using programming languages such as Python (R source is also included in a downloadable form with comments and explanations), but lets you in on the

ground floor, covering the entry-level materials that will get you up and running building models you need to perform practical tasks. It takes a look at the underlying—and fascinating—math principles that power machine learning but also shows that you don't need to be a math whiz to build fun new tools and apply them to your work and study. Understand the history of AI and machine learning Work with Python 3.8 and TensorFlow 2.x (and R as a download) Build and test your own models Use the latest datasets, rather than the worn out data found in other books Apply machine learning to real problems Whether you want to learn for college or to enhance your business or career performance, this friendly beginner's guide is your best introduction to machine learning, allowing you to become quickly confident using this amazing and fast-developing technology that's impacting lives for the better all over the world.

Mastering Computer Vision with TensorFlow 2.x - Krishnendu Kar 2020-05-15
Apply neural network architectures to build state-of-the-art computer vision applications using the Python programming language Key FeaturesGain a fundamental understanding of advanced computer vision and neural network models in use todayCover tasks such as low-level vision, image classification, and object detectionDevelop deep learning models on cloud platforms and optimize them using TensorFlow Lite and the OpenVINO toolkitBook Description Computer vision allows machines to gain human-level understanding to visualize, process, and analyze images and videos. This book focuses on using TensorFlow to help you learn advanced computer vision tasks such as image acquisition, processing, and analysis. You'll start with the key principles of computer vision and deep learning to build a solid foundation, before covering neural network architectures and understanding how they work rather than using them as a black box. Next, you'll explore architectures such as VGG, ResNet, Inception, R-CNN, SSD, YOLO, and MobileNet. As you advance, you'll learn to use visual search methods using transfer learning. You'll also cover advanced computer vision concepts such as semantic segmentation, image inpainting with GAN's, object tracking, video segmentation, and action recognition. Later, the book focuses on how machine learning and deep learning concepts can be used to perform tasks such as edge detection and face recognition. You'll then discover how to develop powerful neural network models on your PC and on various cloud platforms. Finally, you'll learn to perform model optimization methods to deploy models on edge devices for real-time inference. By the end of this book, you'll have a solid understanding of computer vision and be able to confidently develop models to automate tasks. What you will learnExplore methods of feature extraction and image retrieval and visualize different layers of the neural network modelUse TensorFlow for various visual search methods for real-world scenariosBuild neural networks or adjust parameters to optimize the performance of modelsUnderstand TensorFlow DeepLab to perform semantic segmentation on images and DCGAN for image inpaintingEvaluate your model and optimize and integrate it into your application to operate at scaleGet up to speed with techniques for performing manual and automated image annotationWho this book is for This book is for computer vision professionals, image processing professionals, machine learning engineers and AI developers who have some knowledge of machine learning and deep learning and want to build expert-level computer vision applications. In addition to familiarity with TensorFlow, Python knowledge will be required to get started with this book.

iOS Application Development with OpenCV 3 - Joseph Howse 2016-06-30
Create four mobile apps and explore the world through photography and computer vision About This Book Efficiently harness iOS and OpenCV to capture and process high-quality images at high speed Develop photographic apps and augmented reality apps quickly and easily Detect, recognize, and morph faces and objects Who This Book Is For If you want to do computational photography and computer vision on Apple's mobile devices, then this book is for you. No previous experience with app development or OpenCV is required. However, basic knowledge of C++ or Objective-C is recommended. What You Will Learn Use Xcode and Interface Builder to develop iOS apps Obtain OpenCV's standard modules and build extra modules from source Control all the parameters of the iOS device's camera Capture, save, and share photos and videos Analyze colors, shapes, and textures in ordinary and specialized photographs Blend and compare images to create special photographic effects and augmented reality tools Detect faces and morph facial features Classify coins and other objects In Detail iOS Application Development with OpenCV 3 enables you to turn your smartphone camera into an advanced tool for photography and computer vision. Using the highly optimized OpenCV library, you will process high-resolution images in real time. You will

locate and classify objects, and create models of their geometry. As you develop photo and augmented reality apps, you will gain a general understanding of iOS frameworks and developer tools, plus a deeper understanding of the camera and image APIs. After completing the book's four projects, you will be a well-rounded iOS developer with valuable experience in OpenCV. Style and approach The book is practical, creative, and precise. It shows you the steps to create and customize five projects that solve important problems for beginners in mobile app development and computer vision. Complete source code and numerous visual aids are included in each chapter. Experimentation is an important part of the book. You will use computer vision to explore the real world, and then you will refine the projects based on your findings.

Python Image Processing Cookbook - Sandipan Dey 2020-04-17
Explore Keras, scikit-image, open source computer vision (OpenCV), Matplotlib, and a wide range of other Python tools and frameworks to solve real-world image processing problems Key FeaturesDiscover solutions to complex image processing tasks using Python tools such as scikit-image and KerasLearn popular concepts such as machine learning, deep learning, and neural networks for image processingExplore common and not-so-common challenges faced in image processingBook Description With the advancements in wireless devices and mobile technology, there's increasing demand for people with digital image processing skills in order to extract useful information from the ever-growing volume of images. This book provides comprehensive coverage of the relevant tools and algorithms, and guides you through analysis and visualization for image processing. With the help of over 60 cutting-edge recipes, you'll address common challenges in image processing and learn how to perform complex tasks such as object detection, image segmentation, and image reconstruction using large hybrid datasets. Dedicated sections will also take you through implementing various image enhancement and image restoration techniques, such as cartooning, gradient blending, and sparse dictionary learning. As you advance, you'll get to grips with face morphing and image segmentation techniques. With an emphasis on practical solutions, this book will help you apply deep learning techniques such as transfer learning and fine-tuning to solve real-world problems. By the end of this book, you'll be proficient in utilizing the capabilities of the Python ecosystem to implement various image processing techniques effectively. What you will learnImplement supervised and unsupervised machine learning algorithms for image processingUse deep neural network models for advanced image processing tasksPerform image classification, object detection, and face recognitionApply image segmentation and registration techniques on medical images to assist doctorsUse classical image processing and deep learning methods for image restorationImplement text detection in images using Tesseract, the optical character recognition (OCR) engineUnderstand image enhancement techniques such as gradient blendingWho this book is for This book is for image processing engineers, computer vision engineers, software developers, machine learning engineers, or anyone who wants to become well-versed with image processing techniques and methods using a recipe-based approach. Although no image processing knowledge is expected, prior Python coding experience is necessary to understand key concepts covered in the book.

A Practical Introduction to Computer Vision with OpenCV - Kenneth Dawson-Howe 2014-03-20
Explains the theory behind basic computer vision and providesa bridge from the theory to practical implementation using theindustry standard OpenCV libraries Computer Vision is a rapidly expanding area and it is becomingprogressively easier for developers to make use of this field dueto the ready availability of high quality libraries (such as OpenCV2). This text is intended to facilitate the practical use ofcomputer vision with the goal being to bridge the gap between thetheory and the practical implementation of computer vision. Thebook will explain how to use the relevant OpenCV library routinesand will be accompanied by a full working program including thecode snippets from the text. This textbook is a heavilyillustrated, practical introduction to an exciting field, theapplications of which are becoming almost ubiquitous. We arenow surrounded by cameras, for example cameras on computers &tablets/ cameras built into our mobile phones/ camerasin games consoles; cameras imaging difficult modalities (such asultrasound, X-ray, MRI) in hospitals, and surveillance cameras.This book is concerned with helping the next generation of computerdevelopers to make use of all these images in order to developsystems which are more intuitive and interact with us in moreintelligent ways. Explains the theory behind basic computer

vision and provides abridge from the theory to practical implementation using theindustry standard OpenCV libraries Offers an introduction to computer vision, with enough theoryto make clear how the various algorithms work but with an emphasison practical programming issues Provides enough material for a one semester course in computervision at senior undergraduate and Masters levels Includes the basics of cameras and images and image processingto remove noise, before moving on to topics such as imagehistogramming; binary imaging; video processing to detect and modelmoving objects; geometric operations & camera models; edgedetection; features detection; recognition in images Contains a large number of vision application problems toprovide students with the opportunity to solve real problems.Images or videos for these problems are provided in the resourcesassociated with this book which include an enhanced eBook

Python Image Processing Cookbook - Sandipan Dey 2020-04-17
Advancements in wireless devices and mobile technology have enabled the acquisition of a tremendous amount of graphics, pictures, and videos. Through cutting edge recipes, this book provides coverage on tools, algorithms, and analysis for image processing. This book provides solutions addressing the challenges and complex tasks of image processing.

Deep Learning for Coders with fastai and PyTorch - Jeremy Howard 2020-06-29
Deep learning is often viewed as the exclusive domain of math PhDs and big tech companies. But as this hands-on guide demonstrates, programmers comfortable with Python can achieve impressive results in deep learning with little math background, small amounts of data, and minimal code. How? With fastai, the first library to provide a consistent interface to the most frequently used deep learning applications. Authors Jeremy Howard and Sylvain Gugger, the creators of fastai, show you how to train a model on a wide range of tasks using fastai and PyTorch. You'll also dive progressively further into deep learning theory to gain a complete understanding of the algorithms behind the scenes. Train models in computer vision, natural language processing, tabular data, and collaborative filtering Learn the latest deep learning techniques that matter most in practice Improve accuracy, speed, and reliability by understanding how deep learning models work Discover how to turn your models into web applications Implement deep learning algorithms from scratch Consider the ethical implications of your work Gain insight from the foreword by PyTorch cofounder, Soumith Chintala

OpenCV Computer Vision with Python - Joseph Howse 2013
A practical, project-based tutorial for Python developers and hobbyists who want to get started with computer vision with OpenCV and Python.OpenCV Computer Vision with Python is written for Python developers who are new to computer vision and want a practical guide to teach them the essentials. Some understanding of image data (for example, pixels and color channels) would be beneficial. At a minimum you will need access to at least one webcam. Certain exercises require additional hardware like a second webcam, a Microsoft Kinect or an OpenNI-compliant depth sensor such as the Asus Xtion PRO.

Machine Learning in Information and Communication Technology - Hiren Kumar Deva Sarma 2022-12-21
This book presents collection of research papers presented at International Conference on Information and Communication Technology (ICICT 2021) organized by Department of Information Technology, Sikkim Manipal Institute of Technology, Sikkim, India, during 23–24 December 2021. The book includes papers in the research area of communication networks, data science, healthcare informatics, bio-medical image processing, security of information including cryptography, machine learning applications, and AI applications.

Lecture Notes in Real-Time Intelligent Systems - Jolanta Mizera-Pietraszko 2018-05-14
The second volume of the book series highlights works presented at the 2nd International Conference on Real Time Intelligent Systems, held in Casablanca on October 18-20, 2017. The book offers a comprehensive, practical review of the state-of-the-art in designing and implementing real-time intelligent computing for the areas within the conference's scope such as robotics, intelligent alert systems, IoT, remote access control, multi-agent systems, networking, mobile smart systems, crowdsourcing, broadband systems, cloud computing, streaming data and many other applications. Research in real-time computing supports decision making in dynamic environments. Some examples include ABS, FBW flight control, automatic air-conditioning, etc. Intelligent computing relies heavily on artificial intelligence (AI) to make computers act for humans. The authors are confident that the solutions discussed in this book will provide a unique source of information and inspiration for researchers working in AI, distributed coding algorithms or smart services and platforms, and for IT professionals, who can integrate the proposed methods into their practice.

Hands-On GPU-Accelerated Computer Vision with OpenCV and CUDA - Bhaumik Vaidya 2018-09-26
Discover how CUDA allows OpenCV to handle complex and rapidly growing image data processing in computer and machine vision by accessing the power of GPU Key FeaturesExplore examples to leverage the GPU processing power with OpenCV and CUDAEnhance the performance of algorithms on embedded hardware platformsDiscover C++ and Python libraries for GPU accelerationBook Description Ption Computer vision has been revolutionizing a wide range of industries, and OpenCV is the most widely chosen tool for computer vision with its ability to work in multiple programming languages. Nowadays, in computer vision, there is a need to process large images in real time, which is difficult to handle for OpenCV on its own. This is where CUDA comes into the picture, allowing OpenCV to leverage powerful NVDIA GPUs. This book provides a detailed overview of integrating OpenCV with CUDA for practical applications. To start with, you'll understand GPU programming with CUDA, an essential aspect for computer vision developers who have never worked with GPUs. You'll then move on to exploring OpenCV acceleration with GPUs and CUDA by walking through some practical examples. Once you have got to grips with the core concepts, you'll familiarize yourself with deploying OpenCV applications on NVIDIA Jetson TX1, which is popular for computer vision and deep learning applications. The last chapters of the book explain PyCUDA, a Python library that leverages the power of CUDA and GPUs for accelerations and can be used by computer vision developers who use OpenCV with Python. By the end of this book, you'll have enhanced computer vision applications with the help of this book's hands-on approach. What you will learnUnderstand how to access GPU device properties and capabilities from CUDA programsLearn how to accelerate searching and sorting algorithmsDetect shapes such as lines and circles in imagesExplore object tracking and detection with algorithmsProcess videos using different video analysis techniques in Jetson TX1Access GPU device properties from the PyCUDA programUnderstand how kernel execution worksWho this book is for This book is a go-to guide for you if you are a developer working with OpenCV and want to learn how to process more complex image data by exploiting GPU processing. A thorough understanding of computer vision concepts and programming languages such as C++ or Python is expected.

Raspberry Pi Cookbook - Simon Monk 2013-12-10
The world of Raspberry Pi is evolving quickly, with many new interface boards and software libraries becoming available all the time. In this cookbook, prolific hacker and author Simon Monk provides more than 200 practical recipes for running this tiny low-cost computer with Linux, programming it with Python, and hooking up sensors, motors, and other hardware--including Arduino. Make sure to check out 10 of the over 60 video recipes for this book at: http://razzpisampler.oreilly.com/ You can purchase all recipes at:

Introduction to Video and Image Processing - Thomas B. Moeslund 2012-01-25
This textbook presents the fundamental concepts and methods for understanding and working with images and video in an unique, easy-to-read style which ensures the material is accessible to a wide audience. Exploring more than just the basics of image processing, the text provides a specific focus on the practical design and implementation of real systems for processing video data. Features: includes more than 100 exercises, as well as C-code snippets of the key algorithms; covers topics on image acquisition, color images, point processing, neighborhood processing, morphology, BLOB analysis, segmentation in video, tracking, geometric transformation, and visual effects; requires only a minimal understanding of mathematics; presents two chapters dedicated to applications; provides a guide to defining suitable values for parameters in video and image processing systems, and to conversion between the RGB color representation and the HIS, HSV and YUV/YCbCr color representations.

Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow - Aurélien Géron 2019-09-05
Through a series of recent breakthroughs, deep learning has boosted the entire field of machine learning. Now, even programmers who know close to nothing about this technology can use simple, efficient tools to implement programs capable of learning from data. This practical book shows you how. By using concrete examples, minimal theory, and two production-ready Python frameworks—Scikit-Learn and

TensorFlow—author Aurélien Géron helps you gain an intuitive understanding of the concepts and tools for building intelligent systems. You'll learn a range of techniques, starting with simple linear regression and progressing to deep neural networks. With exercises in each chapter to help you apply what you've learned, all you need is programming experience to get started. Explore the machine learning landscape, particularly neural nets Use Scikit-Learn to track an example machine-learning project end-to-end Explore several training models, including support vector machines, decision trees, random forests, and ensemble methods Use the TensorFlow library to build and train neural nets Dive into neural net architectures, including convolutional nets, recurrent nets, and deep reinforcement learning Learn techniques for training and scaling deep neural nets

Computer Vision with SAS - Susan Kahler 2020-07-22
Computer vision is a field of artificial intelligence that trains computers to interpret and understand the visual world. In recent years, computer vision has begun to rival and even surpass human visual abilities in many areas. SAS offers many different solutions to train computers to "see" by identifying and classifying objects, and several groundbreaking papers have been written to demonstrate these techniques. The papers included in this special collection demonstrate how the latest computer vision tools and techniques can be used to solve a variety of business problems.

Programming Interactivity - Joshua Noble 2009-07-21
Make cool stuff. If you're a designer or artist without a lot of programming experience, this book will teach you to work with 2D and 3D graphics, sound, physical interaction, and electronic circuitry to create all sorts of interesting and compelling experiences -- online and off. Programming Interactivity explains programming and electrical engineering basics, and introduces three freely available tools created specifically for artists and designers: Processing, a Java-based programming language and environment for building projects on the desktop, Web, or mobile phones Arduino, a system that integrates a microcomputer prototyping board, IDE, and programming language for creating your own hardware and controls OpenFrameworks, a coding framework simplified for designers and artists, using the powerful C++ programming language BTW, you don't have to wait until you finish the book to actually make something. You'll get working code samples you can use right away, along with the background and technical information you need to design, program, build, and troubleshoot your own projects. The cutting edge design techniques and discussions with leading artists and designers will give you the tools and inspiration to let your imagination take flight.

Python Data Science Handbook - Jake VanderPlas 2016-11-21
For many researchers, Python is a first-class tool mainly because of its libraries for storing, manipulating, and gaining insight from data. Several resources exist for individual pieces of this data science stack, but only with the Python Data Science Handbook do you get them all—IPython, NumPy, Pandas, Matplotlib, Scikit-Learn, and other related tools. Working scientists and data crunchers familiar with reading and writing Python code will find this comprehensive desk reference ideal for tackling day-to-day issues: manipulating, transforming, and cleaning data; visualizing different types of data; and using data to build statistical or machine learning models. Quite simply, this is the must-have reference for scientific computing in Python. With this handbook, you'll learn how to use: IPython and Jupyter: provide computational environments for data scientists using Python NumPy: includes the ndarray for efficient storage and manipulation of dense data arrays in Python Pandas: features the DataFrame for efficient storage and manipulation of labeled/columnar data in Python Matplotlib: includes capabilities for a flexible range of data visualizations in Python Scikit-Learn: for efficient and clean Python implementations of the most important and established machine learning algorithms

Grouping Multidimensional Data - Jacob Kogan 2006-02-10
Publisher description

Deep Learning in Medical Image Analysis - Gobert Lee 2020-02-06
This book presents cutting-edge research and applications of deep learning in a broad range of medical imaging scenarios, such as computer-aided diagnosis, image segmentation, tissue recognition and classification, and other areas of medical and healthcare problems. Each of its chapters covers a topic in depth, ranging from medical image synthesis and techniques for musculoskeletal analysis to diagnostic tools for breast lesions on digital mammograms and glaucoma on retinal fundus images. It also provides an overview of deep learning in medical image analysis and highlights issues and challenges encountered by researchers and clinicians, surveying and discussing practical approaches in general and in the context of specific problems. Academics, clinical and industry researchers, as well as young researchers and graduate students in medical imaging, computer-aided-diagnosis, biomedical engineering and computer vision will find this book a great reference and very useful learning resource.

Programming Computer Vision with Python - Jan Erik Solem 2012-06-19
If you want a basic understanding of computer vision's underlying theory and algorithms, this hands-on introduction is the ideal place to start. You'll learn techniques for object recognition, 3D reconstruction, stereo imaging, augmented reality, and other computer vision applications as you follow clear examples written in Python. Programming Computer Vision with Python explains computer vision in broad terms that won't bog you down in theory. You get complete code samples with explanations on how to reproduce and build upon each example, along with exercises to help you apply what you've learned. This book is ideal for students, researchers, and enthusiasts with basic programming and standard mathematical skills. Learn techniques used in robot navigation, medical image analysis, and other computer vision applications Work with image mappings and transforms, such as texture warping and panorama creation Compute 3D reconstructions from several images of the same scene Organize images based on similarity or content, using clustering methods Build efficient image retrieval techniques to search for images based on visual content Use algorithms to classify image content and recognize objects Access the popular OpenCV library through a Python interface

Mastering OpenCV 4 with Python - Alberto Fernández Villán 2019-03-29
Create advanced applications with Python and OpenCV, exploring the potential of facial recognition, machine learning, deep learning, web computing and augmented reality. Key Features Develop your computer vision skills by mastering algorithms in Open Source Computer Vision 4 (OpenCV 4) and Python Apply machine learning and deep learning techniques with TensorFlow and Keras Discover the modern design patterns you should avoid when developing efficient computer vision applications Book Description OpenCV is considered to be one of the best open source computer vision and machine learning software libraries. It helps developers build complete projects in relation to image processing, motion detection, or image segmentation, among many others. OpenCV for Python enables you to run computer vision algorithms smoothly in real time, combining the best of the OpenCV C++ API and the Python language. In this book, you'll get started by setting up OpenCV and delving into the key concepts of computer vision. You'll then proceed to study more advanced concepts and discover the full potential of OpenCV. The book will also introduce you to the creation of advanced applications using Python and OpenCV, enabling you to develop applications that include facial recognition, target tracking, or augmented reality. Next, you'll learn machine learning techniques and concepts, understand how to apply them in real-world examples, and also explore their benefits, including real-time data production and faster data processing. You'll also discover how to translate the functionality provided by OpenCV into optimized application code projects using Python bindings. Toward the concluding chapters, you'll explore the application of artificial intelligence and deep learning techniques using the popular Python libraries TensorFlow, and Keras. By the end of this book, you'll be able to develop advanced computer vision applications to meet your customers' demands. What you will learn Handle files and images, and explore various image processing techniques Explore image transformations, including translation, resizing, and cropping Gain insights into building histograms Brush up on contour detection, filtering, and drawing Work with Augmented Reality to build marker-based and markerless applications Work with the main machine learning algorithms in OpenCV Explore the deep learning Python libraries and OpenCV deep learning capabilities Create computer vision and deep learning web applications Who this book is for This book is designed for computer vision developers, engineers, and researchers who want to develop modern computer vision applications. Basic experience of OpenCV and Python programming is a must.

Machine Learning for OpenCV - Michael Beyeler 2017-07-14
Expand your OpenCV knowledge and master key concepts of machine learning using this practical, hands-on guide. About This Book Load, store, edit, and visualize data using OpenCV and Python Grasp the

fundamental concepts of classification, regression, and clustering Understand, perform, and experiment with machine learning techniques using this easy-to-follow guide Evaluate, compare, and choose the right algorithm for any task Who This Book Is For This book targets Python programmers who are already familiar with OpenCV; this book will give you the tools and understanding required to build your own machine learning systems, tailored to practical real-world tasks. What You Will Learn Explore and make effective use of OpenCV's machine learning module Learn deep learning for computer vision with Python Master linear regression and regularization techniques Classify objects such as flower species, handwritten digits, and pedestrians Explore the effective use of support vector machines, boosted decision trees, and random forests Get acquainted with neural networks and Deep Learning to address real-world problems Discover hidden structures in your data using k-means clustering Get to grips with data pre-processing and feature engineering In Detail Machine learning is no longer just a buzzword, it is all around us: from protecting your email, to automatically tagging friends in pictures, to predicting what movies you like. Computer vision is one of today's most exciting application fields of machine learning, with Deep Learning driving innovative systems such as self-driving cars and Google's DeepMind. OpenCV lies at the intersection of these topics, providing a comprehensive open-source library for classic as well as state-of-the-art computer vision and machine learning algorithms. In combination with Python Anaconda, you will have access to all the open-source computing libraries you could possibly ask for. Machine learning for OpenCV begins by introducing you to the essential concepts of statistical learning, such as classification and regression. Once all the basics are covered, you will start exploring various algorithms such as decision trees, support vector machines, and Bayesian networks, and learn how to combine them with other OpenCV functionality. As the book progresses, so will your machine learning skills, until you are ready to take on today's hottest topic in the field: Deep Learning. By the end of this book, you will be ready to take on your own machine learning problems, either by building on the existing source code or developing your own algorithm from scratch! Style and approach OpenCV machine learning connects the fundamental theoretical principles behind machine learning to their practical applications in a way that focuses on asking and answering the right questions. This book walks you through the key elements of OpenCV and its powerful machine learning classes, while demonstrating how to get to grips with a range of models.

Learning OpenCV 3 Computer Vision with Python - Joe Minichino 2015-09-29
Unleash the power of computer vision with Python using OpenCV About This Book Create impressive applications with OpenCV and Python Familiarize yourself with advanced machine learning concepts Harness the power of computer vision with this easy-to-follow guide Who This Book Is For Intended for novices to the world of OpenCV and computer vision, as well as OpenCV veterans that want to learn about what's new in OpenCV 3, this book is useful as a reference for experts and a training manual for beginners, or for anybody who wants to familiarize themselves with the concepts of object classification and detection in simple and understandable terms. Basic knowledge about Python and programming concepts is required, although the book has an easy learning curve both from a theoretical and coding point of view. What You Will Learn Install and familiarize yourself with OpenCV 3's Python API Grasp the basics of image processing and video analysis Identify and recognize objects in images and videos Detect and recognize faces using OpenCV Train and use your own object classifiers Learn about machine learning concepts in a computer vision context Work with artificial neural networks using OpenCV Develop your own computer vision real-life application In Detail OpenCV 3 is a state-of-the-art computer vision library that allows a great variety of image and video processing operations. Some of the more spectacular and futuristic features such as face recognition or object tracking are easily achievable with OpenCV 3. Learning the basic concepts behind computer vision algorithms, models, and OpenCV's API will enable the development of all sorts of real-world applications, including security and surveillance. Starting with basic image processing operations, the book will take you through to advanced computer vision concepts. Computer vision is a rapidly evolving science whose applications in the real world are exploding, so this book will appeal to computer vision novices as well as experts of the subject wanting to learn the brand new OpenCV 3.0.0. You will build a theoretical foundation of image processing and video analysis, and progress to the concepts of classification through machine learning, acquiring the technical know-how that will allow you to create and use object detectors and classifiers, and even track objects in movies or video camera feeds. Finally, the journey will

end in the world of artificial neural networks, along with the development of a hand-written digits recognition application. Style and approach This book is a comprehensive guide to the brand new OpenCV 3 with Python to develop real-life computer vision applications.

Computer Vision - Simon J. D. Prince 2012-06-18
A modern treatment focusing on learning and inference, with minimal prerequisites, real-world examples and implementable algorithms.

Python Deep Learning - Valentino Zocca 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.

Shape Recognition - Omid Omidvar 1999
This text reviews current research in natural and synthetic neural networks, as well as reviews in modeling, analysis, design, and development of neural networks in software and hardware areas.

Smart Cities - Sergio Nesmachnow 2019-02-20
This book constitutes the thoroughly refereed proceedings of the First Ibero-American Congress, ICSC-CITIES 2018, held in Soria, Spain, in May 2018. The 15 full papers presented were carefully reviewed and selected from 101 submissions. The papers cover wide research fields including smart cities, energy efficiency and sustainability, infrastructures, smart mobility, intelligent transportation systems, Internet of Things, governance and citizenship.

Deep Learning for Computer Vision - Jason Brownlee 2019-04-04
Step-by-step tutorials on deep learning neural networks for computer vision in python with Keras.

Practical OpenCV - Samarth Brahmbhatt 2013-11-30
Practical OpenCV is a hands-on project book that shows you how to get the best results from OpenCV, the open-source computer vision library. Computer vision is key to technologies like object recognition, shape detection, and depth estimation. OpenCV is an open-source library with over 2500 algorithms that you can use to do all of these, as well as track moving objects, extract 3D models, and overlay augmented reality. It's used by major companies like Google (in its autonomous car), Intel, and Sony; and it is the backbone of the Robot Operating System's computer vision capability. In short, if you're working with computer vision at all, you need to know OpenCV. With Practical OpenCV, you'll be able to: Get OpenCV up and running on

Windows or Linux. Use OpenCV to control the camera board and run vision algorithms on Raspberry Pi. Understand what goes on behind the scenes in computer vision applications like object detection, image stitching, filtering, stereo vision, and more. Code complex computer vision projects for your class/hobby/robot/job, many of which can execute in real time on off-the-shelf processors. Combine different modules that you develop to create your own interactive computer vision app.

Learning OpenCV 3 - Adrian Kaehler 2016-12-14
"This book provides a working guide to the C++ Open Source Computer Vision Library (OpenCV) version 3.x and gives a general background on the field of computer vision sufficient to help readers use OpenCV effectively."--Preface.