Learning OpenCV 4 Computer Vision with Python 3

Third Edition

Joseph Howse and Joe Minichino

Packt

Learning Opencv Computer Vision With The Opencv Library

Wen Pei Sung,Jimmy Chih Ming Kao,Ran Chen

Learning Opencv Computer Vision With The Opencv Library:

Learning OpenCV Gary Bradski,Adrian Kaehler,2008-09-24 This library is useful for practitioners and is an excellent tool for those entering the field it is a set of computer vision algorithms that work as advertised William T Freeman Computer Science and Artificial Intelligence Laboratory Massachusetts Institute of Technology Learning OpenCV puts you in the middle of the rapidly expanding field of computer vision Written by the creators of the free open source OpenCV library this book introduces you to computer vision and demonstrates how you can quickly build applications that enable computers to see and make decisions based on that data Computer vision is everywhere in security systems manufacturing inspection systems medical image analysis Unmanned Aerial Vehicles and more It stitches Google maps and Google Earth together checks the pixels on LCD screens and makes sure the stitches in your shirt are sewn properly OpenCV provides an easy to use computer vision framework and a comprehensive library with more than 500 functions that can run vision code in real time Learning OpenCV will teach any developer or hobbyist to use the framework quickly with the help of hands on exercises in each chapter This book includes A thorough introduction to OpenCV Getting input from cameras Transforming images Segmenting images and shape matching Pattern recognition including face detection Tracking and motion in 2 and 3 dimensions 3D reconstruction from stereo vision Machine learning algorithms Getting machines to see is a challenging but entertaining goal Whether you want to build simple or sophisticated vision applications Learning OpenCV is the book you need to get started

Learning OpenCV Gary Bradski,Adrian Kaehler,2012 Providing an introduction to computer vision the technology that enables computers to see and make decisions based on the data this book explains how developers students and hobbyists can add vision to their projects using OpenCV the widely used free open source computer vision library   Learning OpenCV, 2nd Edition Adrian Kaehler,Gary Bradski,2014 Learning OpenCV puts you in the middle of the rapidly expanding field of computer vision Written by the creators of the free open source OpenCV library this book introduces you to computer vision and demonstrates how you can quickly build applications that enable computers to see and make decisions based on that data The second edition is updated to cover new features and changes in OpenCV 2 0 especially the C interface

Learning OpenCV 3 Computer Vision with Python Joe Minichino,2015 Unleash the power of computer vision with Python using OpenCVAbout 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 guideWho This Book Is ForIntended 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 applicationIn DetailOpenCV 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 approachThis book is a comprehensive guide to the brand new OpenCV 3 with Python to develop real life computer vision applications   Learn OpenCV 4.5 with Python 3.7 by Examples James Chen, What This Book is About When you searched for this book you have already known the importance of the OpenCV Python in the fields of computer vision image processing and machine learning This book begins with step by step instructions of installation as well as a simple Hello World then gets into the OpenCV Basics Image Processing Object Detection and finally Machine Learning Key Features Example for every topic all the source codes are available in Github Line by line explanation of the source codes Focus mainly on implementation of algorithms rather than mathematical theories Whom This Book Is For This book is for people with a variety of computer programming levels from those with very limited knowledge of computer vision to the experienced ones The readers do not need to have previous experiences of Python OpenCV No matter you are a beginner or experienced programmer as long as you want to learn OpenCV with Python you will benefit from this book Table of Contents 1 Introduction 1 1 What Is OpenCV 1 2 Whom This Book Is For 1 3 How to Get the Source Codes for This Book 1 4 Hardware Requirements and Software Versions 1 5 How This Book Is Organized 2 Installation 2 1 Install on Windows 2 2 Install Python on Ubuntu 2 3 Configure PyCharm and Install OpenCV 3 OpenCV Basics 3 1 Load and Display Images 3 2 Load and Display Videos 3 3 Display Webcam 3 4 Play Youtube Video 3 5 Image Fundamentals 3 6 Draw Shapes 3 7 Draw Texts 3 8 Draw an OpenCV like Icon 4 User Interaction 4 1 Mouse Operations 4 2 Draw Circles with Mouse 4 3 Draw Polygon with Mouse 4 4 Crop an Image with Mouse 4 5 Input Values with Trackbars 5 Image Processing 5 1 Change Color Spaces 5 2 Resize Crop and Rotate an Image 5 3 Adjust Contrast and Brightness of an

Image 5 4 Adjust Hue Saturation and Value 5 5 Blend Image 5 6 Bitwise Operation 5 7 Warp Image 5 8 Blur Image 5 9 Histogram 6 Object Detection 6 1 Canny Edge Detection 6 2 Dilation and Erosion 6 3 Shape Detection 6 4 Color Detection 6 5 Text Recognition with Tesseract 6 6 Human Detection 6 7 Face and Eye Detection 6 8 Remove Background 6 9 Blur Background 7 Machine Learning 7 1 K Means Clustering 7 2 K Nearest Neighbors 7 3 Support Vector Machine 7 4 Artificial Neural Network ANN About the Author Index **Learning OpenCV 3 Computer Vision with Python** Joe Minichino,Joseph Howse,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 **OpenCV 4 Computer Vision Application Programming Cookbook** David Millán Escrivá,Robert Laganiere,2019-05-03 Discover interesting recipes to help you understand the concepts of object detection image processing and facial detection Key FeaturesExplore the latest features and APIs in OpenCV 4 and build computer vision

algorithmsDevelop effective robust and fail safe vision for your applicationsBuild computer vision algorithms with machine learning capabilitiesBook Description OpenCV is an image and video processing library used for all types of image and video analysis Throughout the book you ll work through recipes that implement a variety of tasks such as facial recognition and detection With 70 self contained tutorials this book examines common pain points and best practices for computer vision CV developers Each recipe addresses a specific problem and offers a proven best practice solution with insights into how it works so that you can copy the code and configuration files and modify them to suit your needs This book begins by setting up OpenCV and explains how to manipulate pixels You ll understand how you can process images with classes and count pixels with histograms You ll also learn detecting describing and matching interest points As you advance through the chapters you ll get to grips with estimating projective relations in images reconstructing 3D scenes processing video sequences and tracking visual motion In the final chapters you ll cover deep learning concepts such as face and object detection By the end of the book you ll be able to confidently implement a range to computer vision algorithms to meet the technical requirements of your complex CV projects What you will learnInstall and create a program using the OpenCV librarySegment images into homogenous regions and extract meaningful objectsApply image filters to enhance image contentExploit image geometry to relay different views of a pictured sceneCalibrate the camera from different image observationsDetect people and objects in images using machine learning techniquesReconstruct a 3D scene from imagesExplore face detection using deep learningWho this book is for If you re a CV developer or professional who already uses or would like to use OpenCV for building computer vision software this book is for you You ll also find this book useful if you re a C programmer looking to extend your computer vision skillset by learning OpenCV   *Learning OpenCV 3* Adrian Kaehler. Gary Bradski,2016   **Learn Computer Vision Using OpenCV** Sunila Gollapudi,2019-04-26 Build practical applications of computer vision using the OpenCV library with Python This book discusses different facets of computer vision such as image and object detection tracking and motion analysis and their applications with examples The author starts with an introduction to computer vision followed by setting up OpenCV from scratch using Python The next section discusses specialized image processing and segmentation and how images are stored and processed by a computer This involves pattern recognition and image tagging using the OpenCV library Next you ll work with object detection video storage and interpretation and human detection using OpenCV Tracking and motion is also discussed in detail The book also discusses creating complex deep learning models with CNN and RNN The author finally concludes with recent applications and trends in computer vision After reading this book you will be able to understand and implement computer vision and its applications with OpenCV using Python You will also be able to create deep learning models with CNN and RNN and understand how these cutting edge deep learning architectures work What You Will Learn Understand what computer vision is and its overall application in intelligent automation systems Discover the deep learning techniques required to build computer vision

applications Build complex computer vision applications using the latest techniques in OpenCV Python and NumPy Create practical applications and implementations such as face detection and recognition handwriting recognition object detection and tracking and motion analysis Who This Book Is ForThose who have a basic understanding of machine learning and Python and are looking to learn computer vision and its applications **Deep Learning for Computer Vision** Rajalingappaa Shanmugamani,2018-01-23 Learn how to model and train advanced neural networks to implement a variety of Computer Vision tasks Key Features Train different kinds of deep learning model from scratch to solve specific problems in Computer Vision Combine the power of Python Keras and TensorFlow to build deep learning models for object detection image classification similarity learning image captioning and more Includes tips on optimizing and improving the performance of your models under various constraints Book Description Deep learning has shown its power in several application areas of Artificial Intelligence especially in Computer Vision Computer Vision is the science of understanding and manipulating images and finds enormous applications in the areas of robotics automation and so on This book will also show you with practical examples how to develop Computer Vision applications by leveraging the power of deep learning In this book you will learn different techniques related to object classification object detection image segmentation captioning image generation face analysis and more You will also explore their applications using popular Python libraries such as TensorFlow and Keras This book will help you master state of the art deep learning algorithms and their implementation What you will learn Set up an environment for deep learning with Python TensorFlow and Keras Define and train a model for image and video classification Use features from a pre trained Convolutional Neural Network model for image retrieval Understand and implement object detection using the real world Pedestrian Detection scenario Learn about various problems in image captioning and how to overcome them by training images and text together Implement similarity matching and train a model for face recognition Understand the concept of generative models and use them for image generation Deploy your deep learning models and optimize them for high performance Who this book is for This book is targeted at data scientists and Computer Vision practitioners who wish to apply the concepts of Deep Learning to overcome any problem related to Computer Vision A basic knowledge of programming in Python and some understanding of machine learning concepts is required to get the best out of this book   Frontiers of Manufacturing Science and Measuring Technology III Wen Pei Sung,Jimmy Chih Ming Kao,Ran Chen,2013-09-03 Selected peer reviewed papers from the 2013 3rd International Conference on Frontiers of Manufacturing Science and Measuring Technology ICFMM 2013 July 30 31 2013 LiJiang China   OpenCV 3 Computer Vision with Python Cookbook Aleksei Spizhevoi,Aleksandr Rybnikov,2018-03-23 OpenCV 3 is a native cross platform library for computer vision machine learning and image processing OpenCV s convenient high level APIs hide very powerful internals designed for computational efficiency that can take advantage of multicore and GPU processing This book will help you tackle increasingly challenging computer vision problems   Learning Robotics Using Python Lentin

Joseph,2015-05-27 If you are an engineer a researcher or a hobbyist and you are interested in robotics and want to build your own robot this book is for you Readers are assumed to be new to robotics but should have experience with Python **Deep Learning on Embedded Systems** Tariq M. Arif,2025-04-29 Comprehensive accessible introduction to deep learning for engineering tasks through Python programming low cost hardware and freely available software Deep Learning On Embedded Systems is a comprehensive guide to the practical implementation of deep learning for engineering tasks through computers and embedded hardware such as Raspberry Pi and Nvidia Jetson Nano After an introduction to the field the book provides fundamental knowledge on deep learning convolutional and recurrent neural networks computer vision and basics of Linux terminal and docker engines This book shows detailed setup steps of Jetson Nano and Raspberry Pi for utilizing essential frameworks such as PyTorch and OpenCV GPU configuration and dependency installation procedure for using PyTorch is also discussed allowing newcomers to seamlessly navigate the learning curve A key challenge of utilizing deep learning on embedded systems is managing limited GPU and memory resources This book outlines a strategy of training complex models on a desktop computer and transferring them to embedded systems for inference Also students and researchers often face difficulties with the varying probabilistic theories and notations found in data science literature To simplify this the book mainly focuses on the practical implementation part of deep learning using Python programming low cost hardware and freely available software such as Anaconda and Visual Studio Code To aid in reader learning questions and answers are included at the end of most chapters Written by a highly qualified author Deep Learning On Embedded Systems includes discussion on Fundamentals of deep learning including neurons and layers activation functions network architectures hyperparameter tuning and convolutional and recurrent neural networks CNNs RNNs PyTorch OpenCV and other essential framework setups for deep transfer learning along with Linux terminal operations docker engine docker images and virtual environments in embedded devices Training models for image classification and object detection with classification then converting trained PyTorch models to ONNX format for efficient deployment on Jetson Nano and Raspberry Pi Deep Learning On Embedded Systems serves as an excellent introduction to the field for undergraduate engineering students seeking to learn deep learning implementations for their senior capstone or class projects and graduate researchers and educators who wish to implement deep learning in their research **Learning Raspberry Pi** Samarth Shah,2015-04-24 If you have a passion for technology and want to explore the world of Raspberry Pi then this book provides you with all the tools and information you are looking for Although being familiar with basic programming concepts is useful you can still learn a lot from this book as a wide variety of topics are covered Information, Communication and Engineering Teen Hang Meen,2013-02-27 Selected peer reviewed papers from the 2012 International Conference on Information Communication and Engineering ICICE 2012 December 15 20 2012 Fuzhou Taiwan *Kinect Open Source Programming Secrets : Hacking the Kinect with OpenNI, NITE, and Java* Andrew Davison,2012-04-18 Program Kinect to do

awesome things using a unique selection of open source software The Kinect motion sensing device for the Xbox 360 and Windows became the world s fastest selling consumer electronics device when it was released 8 million sold in its first 60 days and won prestigious awards such as Gaming Gadget of the Year Now Kinect Open Source Programming Secrets lets YOU harness the Kinect s powerful sensing capabilities for gaming science multimedia projects and a mind boggling array of other applications on platforms running Windows Mac OS and Linux Dr Andrew Davison a user interface programming expert delivers exclusive coverage of how to program the Kinect sensor with the Java wrappers for OpenNI and NITE which are APIs created by PrimeSense the primary developers of the Kinect s technology Beginning with the basics depth imaging 3D point clouds skeletal tracking and hand gestures the book examines many other topics including Kinect gaming FAAST style gestures that aren t part of standard NITE motion detection using OpenCV how to create gesture driven GUIs accessing the Kinect s motor and accelerometer and other tips and techniques Inside Free open source APIs to let you develop amazing Kinect hacks for commercial or private use Full coverage of depth detection camera and infrared imaging point clouds Kinect gaming 3D programming gesture based GUIs and more Online access to detailed code examples on the author s web site plus bonus chapters on speech recognition beamforming and other exotica From the Author Why Buy This Book I can suggest four reasons for buying this book It offers a unique choice of Kinect programming tools It explains the official Java wrappers for those tools It covers topics not found elsewhere It provides depth but with brevity Unique Programming Tools This is the only book on programming the Kinect using the OpenNI library NITE and Java as of April 2012 when this book went to press Official Java Wrappers This is the only book that explains the official Java wrappers for OpenNI and NITE again as of April 2012 By official I mean that these bindings were developed by PrimeSense Obvious advantages of Java include object orientation cross platform support availability for free and many people including you probably knowing how to program with it Most important programming in Java gives you access to a massive number of libraries for graphics networking and beyond that can be linked to the Kinect without much effort For example I ll demonstrate how to use the Java 3D graphics library and the Java binding for the OpenCV computer vision package The main drawback of using the PrimeSense Java wrappers is their lack of documentation As I explain in Chapter 1 I had to decompile the libraries JAR files and work out the correspondences between the Java source and the somewhat better documented C OpenNI NITE APIs This is why including Secrets in the book s title isn t too excessive A Wide Range of Topics This book covers programming topics not found elsewhere I start off with the basics of course with chapters on depth infrared and RGB imaging point clouds skeletal user tracking hand tracking and gesture support Moving beyond that I cover several novel and unusual features including the following Kinect gaming based around a version of the classic Breakout video game Controls for the Kinect motor LED and accelerometer which are not part of the standard OpenNI API In fact their absence is often held up as a serious drawback of the API It s actually quite easy to add these capabilities using a custom built USB driver 3D graphics programming in the

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