Learning OpenCV 4 Computer Vision with Python 3

Third Edition

Joseph Howse and Joe Minichino

Packt

Learning Opencv Computer Vision With The Opencv Library

Joe Minichino,Joseph Howse

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 3 Adrian Kaehler,Gary Bradski,2016-12-14 Get started in the rapidly expanding field of computer vision with this practical guide Written by Adrian Kaehler and Gary Bradski creator of the open source OpenCV library this book provides a thorough introduction for developers academics roboticists and hobbyists You ll learn what it takes to build applications that enable computers to see and make decisions based on that data With over 500 functions that span many areas in vision OpenCV is used for commercial applications such as security medical imaging pattern and face recognition robotics and factory product inspection This book gives you a firm grounding in computer vision and OpenCV for building simple or sophisticated vision applications Hands on exercises in each chapter help you apply what you ve learned This volume covers the entire library in its modern C implementation including machine learning tools for computer vision Learn OpenCV data types array types and array operations Capture and store still and video images with HighGUI Transform images to stretch shrink warp remap and repair Explore pattern recognition including face detection Track objects and motion through the visual field Reconstruct 3D images from stereo vision Discover basic and advanced machine learning techniques in OpenCV   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 **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   *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* 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   Learn Computer Vision Using OpenCV Sunila Gollapudi,2019 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 For Those who have a basic understanding of machine learning and Python and are looking to learn computer vision and its 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   Algorithms for Image Processing and Computer Vision J. R. Parker,2010-11-29 A cookbook of algorithms for common image processing applications Thanks to advances in computer hardware and software algorithms have been developed that support sophisticated image processing without requiring an extensive background in mathematics This bestselling book has been fully updated with the newest of these including 2D vision methods in content based searches and the use of graphics cards as image processing computational aids It s an ideal reference for software engineers and developers advanced programmers graphics programmers scientists and other specialists who require highly specialized image processing Algorithms now exist for a wide variety of sophisticated image processing applications required by software engineers and developers advanced programmers graphics programmers scientists and related specialists This bestselling book has been completely updated to include the latest algorithms including 2D vision methods in content based searches details on modern classifier methods and graphics cards used as image processing computational aids Saves hours of mathematical calculating by using distributed processing and GPU programming and gives non mathematicians the shortcuts needed to program relatively sophisticated applications Algorithms for Image Processing and Computer Vision 2nd Edition provides the tools to speed development of image processing applications   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   **Computer Vision for Multimedia Applications: Methods and Solutions** Wang, Jinjun,Cheng, Jian,Jiang, Shuqiang,2010-10-31 This book presents the latest developments in computer vision methods applicable to various problems in multimedia computing including new ideas as well as problems in computer vision and multimedia computing Provided by publisher   **Machine Learning Algorithms for Industrial Applications** Santosh

Kumar Das,Shom Prasad Das,Nilanjan Dey,Aboul-Ella Hassanien,2020-07-18 This book explores several problems and their solutions regarding data analysis and prediction for industrial applications Machine learning is a prominent topic in modern industries its influence can be felt in many aspects of everyday life as the world rapidly embraces big data and data analytics Accordingly there is a pressing need for novel and innovative algorithms to help us find effective solutions in industrial application areas such as media healthcare travel finance and retail In all of these areas data is the crucial parameter and the main key to unlocking the value of industry The book presents a range of intelligent algorithms that can be used to filter useful information in the above mentioned application areas and efficiently solve particular problems Its main objective is to raise awareness for this important field among students researchers and industrial practitioners   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   **Implementations and Applications of Machine Learning** Saad Subair,Christopher Thron,2020-04-23 This book provides step by step explanations of successful implementations and practical applications of machine learning The book s GitHub page contains software codes to assist readers in adapting materials and methods for their own use A wide variety of applications are discussed including wireless mesh network and power systems optimization computer vision image and facial recognition protein prediction data mining and data discovery Numerous state of the art machine learning techniques are employed with detailed explanations including biologically inspired optimization genetic and other evolutionary algorithms swarm intelligence Viola Jones face detection Gaussian mixture modeling support vector machines deep convolutional neural networks with performance enhancement techniques including network design learning rate optimization data augmentation transfer learning spiking neural networks and timing dependent plasticity frequent itemset mining binary classification and dynamic programming This book provides valuable information on effective cutting edge techniques and approaches for students researchers practitioners and teachers in the field of machine learning   **Image Processing and Computer Vision in iOS** Oge Marques,2020-11-23 This book presents the fundamentals of mobile visual computing in iOS development and provides directions for developers and researchers interested in developing iOS applications with image processing and computer vision capabilities Presenting a technical overview of some of the tools languages libraries frameworks and APIs currently available for developing iOS applications Image Processing and Computer Vision in iOS reveals the rich capabilities in image processing and computer vision Its main goal is to provide a road map to what is currently available and a path to successfully tackle this rather complex but highly rewarding task   **5th Kuala Lumpur International Conference on Biomedical Engineering 2011** Hua-Nong Ting,2011-06-17 The Biomed 2011

brought together academicians and practitioners in engineering and medicine in this ever progressing field This volume presents the proceedings of this international conference which was hold in conjunction with the 8th Asian Pacific Conference on Medical and Biological Engineering APCMBE 2011 on the 20th to the 23rd of June 2011 at Berjaya Times Square Hotel Kuala Lumpur The topics covered in the conference proceedings include Artificial organs bioengineering education bionanotechnology biosignal processing bioinformatics biomaterials biomechanics biomedical imaging biomedical instrumentation BioMEMS clinical engineering prosthetics **Machine Learning for Audio, Image and Video Analysis** Francesco Camastra,Alessandro Vinciarelli,2015-07-21 This second edition focuses on audio image and video data the three main types of input that machines deal with when interacting with the real world A set of appendices provides the reader with self contained introductions to the mathematical background necessary to read the book Divided into three main parts From Perception to Computation introduces methodologies aimed at representing the data in forms suitable for computer processing especially when it comes to audio and images Whilst the second part Machine Learning includes an extensive overview of statistical techniques aimed at addressing three main problems namely classification automatically assigning a data sample to one of the classes belonging to a predefined set clustering automatically grouping data samples according to the similarity of their properties and sequence analysis automatically mapping a sequence of observations into a sequence of human understandable symbols The third part Applications shows how the abstract problems defined in the second part underlie technologies capable to perform complex tasks such as the recognition of hand gestures or the transcription of handwritten data Machine Learning for Audio Image and Video Analysis is suitable for students to acquire a solid background in machine learning as well as for practitioners to deepen their knowledge of the state of the art All application chapters are based on publicly available data and free software packages thus allowing readers to replicate the experiments **Computer Vision** Pancham Shukla,Rajanikanth Aluvalu,Shilpa Gite,Uma Maheswari,2023-02-20 This book focuses on the latest developments in the fields of visual AI image processing and computer vision It shows research in basic techniques like image pre processing feature extraction and enhancement along with applications in biometrics healthcare neuroscience and forensics The book highlights algorithms processes novel architectures and results underlying machine intelligence with detailed execution flow of models Recent Trends in Communication and Intelligent Systems Aditya Kumar Singh Pundir,Anupam Yadav,Swagatam Das,2024-12-30 This book presents best selected research papers presented at the Fifth International Conference on Recent Trends in Communication and Intelligent Systems ICRTCIS 2024 organized by Arya College of Engineering and IT Jaipur on May 3 4 2024 It discusses the latest technologies in communication and intelligent systems covering various areas of communication engineering such as signal processing VLSI design embedded systems wireless communications and electronics and communications in general Featuring work by leading researchers and technocrats the book serves as a valuable reference resource for young researchers and academics as well as practitioners in

industry   **Approaches to Probabilistic Model Learning for Mobile Manipulation Robots** Jürgen Sturm,2013-12-12 This book presents techniques that enable mobile manipulation robots to autonomously adapt to new situations Covers kinematic modeling and learning self calibration tactile sensing and object recognition imitation learning and programming by demonstration

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