

An Introduction To Opencv Using Python With Ubuntu

Learning OpenCV 4 Computer Vision with Python 3Practical Computer VisionInstant Opencv for IOSComputer Vision Projects with OpenCV and Python 3Learning Image Processing with OpenCVLearn OpenCV 4 by Building ProjectsOpenCV EssentialsOpenCV 4 Computer Vision Application Programming CookbookOpenCV By ExampleA Practical Introduction to Computer Vision with OpenCV, Enhanced EditionOpenCV Computer Vision with PythonMastering OpenCV 4 with PythonHands-On Computer Vision with JuliaBeginning Robotics with Raspberry Pi and ArduinoLearning OpenCVPractical OpenCVBuilding Computer Vision Projects with OpenCV 4 and C++Learning Robotics Using PythonLearn OpenCV 4 by Building ProjectsComputer Vision with OpenCV 3 and Qt5Learn Computer Vision Using OpenCVMastering OpenCV Android Application ProgrammingLearning OpenCV 3BeagleBone By ExampleOpenCV 3 Computer Vision Application Programming CookbookComputer Vision with OpenCV 3 and Qt5Concise Computer VisionProgramming Computer Vision with PythonLearning OpenCV 3 Computer Vision with PythonOpenCV 2 Computer Vision Application Programming CookbookA Practical Introduction to Computer Vision with OpenCVHands-On GPU-Accelerated Computer Vision with OpenCV and CUDAOpenCV with Python BlueprintsComputer Vision with Python 3Mastering OpenCV 4Raspberry Pi Computer Vision ProgrammingMastering OpenCV with Practical Computer Vision ProjectsOpenCV 3 Computer Vision with Python CookbookAndroid Application Programming with OpenCVMastering OpenCV with Practical Computer Vision Projects

Learning OpenCV 4 Computer Vision with Python 3

If you are a competent C++ programmer and want to learn the tricks of image processing with OpenCV, then this book is for you. A basic understanding of image processing is required.

Practical Computer Vision

Delve into practical computer vision and image processing projects and get up to speed with advanced object detection techniques and machine learning algorithms

Key Features Discover best practices for engineering and maintaining OpenCV projects Explore important deep learning tools for image classification Understand basic image matrix formats and filters

Book Description OpenCV is one of the best open source libraries available and can help you focus on constructing complete projects on image processing, motion detection, and image segmentation. This Learning Path is your guide to understanding OpenCV concepts and algorithms through real-world examples and activities. Through various projects, you'll also discover how to use complex computer vision and machine learning algorithms and face detection to extract the maximum amount of information from images and videos. In later chapters, you'll learn to enhance your videos and images with optical flow analysis and background subtraction. Sections in the Learning Path will help you get to grips with text segmentation and recognition, in addition to guiding you through the basics of the new and improved deep learning modules. By the

end of this Learning Path, you will have mastered commonly used computer vision techniques to build OpenCV projects from scratch. This Learning Path includes content from the following Packt books: Mastering OpenCV 4 - Third Edition by Roy Shilkrot and David Millán Escrivá Learn OpenCV 4 By Building Projects - Second Edition by David Millán Escrivá, Vinícius G. Mendonça, and Prateek Joshi What you will learn Stay up-to-date with algorithmic design approaches for complex computer vision tasks Work with OpenCV's most up-to-date API through various projects Understand 3D scene reconstruction and Structure from Motion (SfM) Study camera calibration and overlay augmented reality (AR) using the ArUco module Create CMake scripts to compile your C++ application Explore segmentation and feature extraction techniques Remove backgrounds from static scenes to identify moving objects for surveillance Work with new OpenCV functions to detect and recognize text with Tesseract Who this book is for If you are a software developer with a basic understanding of computer vision and image processing and want to develop interesting computer vision applications with OpenCV, this Learning Path is for you. Prior knowledge of C++ and familiarity with mathematical concepts will help you better understand the concepts in this Learning Path.

Instant Opencv for IOS

OpenCV is a famous computer vision library, used to analyze and transform copious amounts of image data, even in real time and on a mobile device. This book focuses on leveraging mobile platforms to build interactive and useful applications. The book starts off with an introduction to OpenCV and Android and how they interact with each other using OpenCV's Java API. You'll also discover basic image processing techniques such as erosion and dilation of images, before walking through how to build more complex applications, such as object detection, image stitching, and face detection. As you progress, you will be introduced to OpenCV's machine learning framework, enabling you to make your applications smarter. The book ends with a short chapter covering useful Android tips and tricks and some common errors and solutions that people might face while building an application. By the end of the book, readers will have gained more expertise in building their own OpenCV projects for the Android platform and integrating OpenCV application programming into existing projects.

Computer Vision Projects with OpenCV and Python 3

Blend the power of Qt with OpenCV to build cross-platform computer vision applications Key Features ● Start creating robust applications with the power of OpenCV and Qt combined ● Learn from scratch how to develop cross-platform computer vision applications ● Accentuate your OpenCV applications by developing them with Qt Book Description Developers have been using OpenCV library to develop computer vision applications for a long time. However, they now need a more effective tool to get the job done and in a much better and modern way. Qt is one of the major frameworks available for this task at the moment. This book will teach you to develop applications with the combination of OpenCV 3 and Qt5, and how to create cross-platform computer vision applications. We'll begin by introducing Qt, its IDE, and its SDK. Next you'll learn how to use the OpenCV API to integrate both tools, and see how to configure Qt to use OpenCV. You'll go on to

build a full-fledged computer vision application throughout the book. Later, you'll create a stunning UI application using the Qt widgets technology, where you'll display the images after they are processed in an efficient way. At the end of the book, you'll learn how to convert OpenCV Mat to Qt QImage. You'll also see how to efficiently process images to filter them, transform them, detect or track objects as well as analyze video. You'll become better at developing OpenCV applications.

What you will learn ● Get an introduction to Qt IDE and SDK ● Be introduced to OpenCV and see how to communicate between OpenCV and Qt ● Understand how to create UI using Qt Widgets ● Learn to develop cross-platform applications using OpenCV 3 and Qt 5 ● Explore the multithreaded application development features of Qt5 ● Improve OpenCV 3 application development using Qt5 ● Build, test, and deploy Qt and OpenCV apps, either dynamically or statically ● See Computer Vision technologies such as filtering and transformation of images, detecting and matching objects, template matching, object tracking, video and motion analysis, and much more ● Be introduced to QML and Qt Quick for iOS and Android application development

Who this book is for This book is for readers interested in building computer vision applications. Intermediate knowledge of C++ programming is expected. Even though no knowledge of Qt5 and OpenCV 3 is assumed, if you're familiar with these frameworks, you'll benefit.

Learning Image Processing with OpenCV

Work on practical computer vision projects covering advanced object detector techniques and modern deep learning and machine learning algorithms

Key Features

- Learn about the new features that help unlock the full potential of OpenCV 4
- Build face detection applications with a cascade classifier using face landmarks
- Create an optical character recognition (OCR) model using deep learning and convolutional neural networks

Book Description

Mastering OpenCV, now in its third edition, targets computer vision engineers taking their first steps toward mastering OpenCV. Keeping the mathematical formulations to a solid but bare minimum, the book delivers complete projects from ideation to running code, targeting current hot topics in computer vision such as face recognition, landmark detection and pose estimation, and number recognition with deep convolutional networks. You'll learn from experienced OpenCV experts how to implement computer vision products and projects both in academia and industry in a comfortable package. You'll get acquainted with API functionality and gain insights into design choices in a complete computer vision project. You'll also go beyond the basics of computer vision to implement solutions for complex image processing projects. By the end of the book, you will have created various working prototypes with the help of projects in the book and be well versed with the new features of OpenCV4.

What you will learn

- Build real-world computer vision problems with working OpenCV code samples
- Uncover best practices in engineering and maintaining OpenCV projects
- Explore algorithmic design approaches for complex computer vision tasks
- Work with OpenCV's most updated API (v4.0.0) through projects
- Understand 3D scene reconstruction and Structure from Motion (SfM)
- Study camera calibration and overlay AR using the ArUco Module

Who this book is for

This book is for those who have a basic knowledge of OpenCV and are competent C++ programmers. You need to have an understanding of some of the more theoretical/mathematical concepts, as we move quite quickly throughout the book.

Learn OpenCV 4 by Building Projects

Learn how to build physical computing systems using BeagleBone Black and Python About This Book Get to grips with the fundamentals of BeagleBone Leverage Python scripts to program BeagleBone for your requirements Build four exciting projects, from home automation to a tele-controlled robot Who This Book Is For This book is intended for hobbyists and consumers who wish to create impressive projects using BeagleBone. You must be familiar with Python programming. What You Will Learn Program on BeagleBone Black using Python Interface sensors and actuators to BeagleBone Black Build your own real-time physical computing systems Connect physical computing systems to cloud servers Build your own home automation and home security system Build your own tele-controlled robot with real-time video streaming In Detail BeagleBone is a low cost, community-supported development platform to develop a variety of electronic projects. This book will introduce you to BeagleBone and get you building fun, cool, and innovative projects with it. Start with the specifications of BeagleBone Black and its operating systems, then get to grips with the GPIOs available in BeagleBone Black. Work through four types of exciting projects: building real-time physical computing systems, home automation, image processing for a security system, and building your own tele-controlled robot and learn the fundamentals of a variety of projects in a single book. By the end of this book, you will be able to write code for BeagleBone in order to operate hardware and impart decision-making capabilities with the help of efficient coding in Python. Style and approach This book is a step by step guide that will walk you through the fundamentals of building different projects using BeagleBone Black.

OpenCV Essentials

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. What you'll learn The ins and outs of OpenCV programming on Windows and Linux Transforming and filtering images Detecting corners, edges, lines, and circles in images and video Detecting pre-trained objects in images and video Making panoramas by stitching images together Getting depth information by using stereo cameras Basic machine learning techniques BONUS: Learn how to run OpenCV on Raspberry Pi Who this book is for This book is for programmers and makers with little or no previous exposure to computer vision.

Some proficiency with C++ is required. Table of Contents
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OpenCV 4 Computer Vision Application Programming Cookbook

Learn how to use a Raspberry Pi in conjunction with an Arduino to build a basic robot with advanced capabilities. Getting started in robotics does not have to be difficult. This book is an insightful and rewarding introduction to robotics and a catalyst for further directed study. You'll be led step by step through the process of building a robot that uses the power of a Linux based computer paired with the simplicity of Arduino. You'll learn why the Raspberry Pi is a great choice for a robotics platform; its strengths as well as its shortcomings; how to overcome these limitations by implementing an Arduino; and the basics of the Python programming language as well as some of the more powerful features. With the Raspberry Pi you can give your project the power of a Linux computer, while Arduino makes interacting with sensors and motors very easy. These two boards are complimentary in their functions; where one falters the other performs admirably. The book also includes references to other great works to help further your growth in the exciting, and now accessible, field of smart robotics. As a bonus, the final chapter of the book demonstrates the real power of the Raspberry Pi by implementing a basic vision system. Using OpenCV and a standard USB web cam, you will build a robot that can chase a ball. What You'll Learn
Install Raspbian, the operating system that drives the Raspberry Pi
Drive motors through an I2C motor controller
Read data through sensors attached to an Arduino
Who This Book Is For
Hobbyists and students looking for a rapid start in robotics. It assumes no technical background. Readers are guided to pursue the areas that interest them in more detail as they learn.

OpenCV By Example

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.

A Practical Introduction to Computer Vision with OpenCV, Enhanced Edition

Blend the power of Qt with OpenCV to build cross-platform computer vision applications

Key Features

- Start creating robust applications with the power of OpenCV and Qt combined
- Learn from scratch how to develop cross-platform computer vision applications
- Accentuate your OpenCV applications by developing them with Qt

Book Description Developers have been using OpenCV library to develop computer vision applications for a long time. However, they now need a more effective tool to get the job done and in a much better and modern way. Qt is one of the major frameworks available for this task at the moment. This book will teach you to develop applications with the combination of OpenCV 3 and Qt5, and how to create cross-platform computer vision applications. We'll begin by introducing Qt, its IDE, and its SDK. Next you'll learn how to use the OpenCV API to integrate both tools, and see how to configure Qt to use OpenCV. You'll go on to build a full-fledged computer vision application throughout the book. Later, you'll create a stunning UI application using the Qt widgets technology, where you'll display the images after they are processed in an efficient way. At the end of the book, you'll learn how to convert OpenCV Mat to Qt QImage. You'll also see how to efficiently process images to filter them, transform them, detect or track objects as well as analyze video. You'll become better at developing OpenCV applications.

What you will learn

- Get an introduction to Qt IDE and SDK
- Be introduced to OpenCV and see how to communicate between OpenCV and Qt
- Understand how to create UI using Qt Widgets
- Learn to develop cross-platform applications using

OpenCV 3 and Qt 5 ● Explore the multithreaded application development features of Qt5 ● Improve OpenCV 3 application development using Qt5 ● Build, test, and deploy Qt and OpenCV apps, either dynamically or statically ● See Computer Vision technologies such as filtering and transformation of images, detecting and matching objects, template matching, object tracking, video and motion analysis, and much more ● Be introduced to QML and Qt Quick for iOS and Android application development Who this book is for This book is for readers interested in building computer vision applications. Intermediate knowledge of C++ programming is expected. Even though no knowledge of Qt5 and OpenCV 3 is assumed, if you're familiar with these frameworks, you'll benefit.

OpenCV Computer Vision with Python

Explore the various packages in Julia that support image processing and build neural networks for video processing and object tracking. Key Features Build a full-fledged image processing application using JuliaImages Perform basic to advanced image and video stream processing with Julia's APIs Understand and optimize various features of OpenCV with easy examples Book Description Hands-On Computer Vision with Julia is a thorough guide for developers who want to get started with building computer vision applications using Julia. Julia is well suited to image processing because it's easy to use and lets you write easy-to-compile and efficient machine code. . This book begins by introducing you to Julia's image processing libraries such as Images.jl and ImageCore.jl. You'll get to grips with analyzing and transforming images using JuliaImages; some of the techniques discussed include enhancing and adjusting images. As you make your way through the chapters, you'll learn how to classify images, cluster them, and apply neural networks to solve computer vision problems. In the concluding chapters, you will explore OpenCV applications to perform real-time computer vision analysis, for example, face detection and object tracking. You will also understand Julia's interaction with Tesseract to perform optical character recognition and build an application that brings together all the techniques we introduced previously to consolidate the concepts learned. By end of the book, you will have understood how to utilize various Julia packages and a few open source libraries such as Tesseract and OpenCV to solve computer vision problems with ease. What you will learn Analyze image metadata and identify critical data using JuliaImages Apply filters and improve image quality and color schemes Extract 2D features for image comparison using JuliaFeatures Cluster and classify images with KNN/SVM machine learning algorithms Recognize text in an image using the Tesseract library Use OpenCV to recognize specific objects or faces in images and videos Build neural network and classify images with MXNet Who this book is for Hands-On Computer Vision with Julia is for Julia developers who are interested in learning how to perform image processing and want to explore the field of computer vision. Basic knowledge of Julia will help you understand the concepts more effectively.

Mastering OpenCV 4 with Python

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.

Hands-On Computer Vision with Julia

A practical guide designed to get you from basics to current state of art in computer vision systems. Key Features Master the different tasks associated with Computer Vision and develop your own Computer Vision applications with ease Leverage the power of Python, Tensorflow, Keras, and OpenCV to perform image processing, object detection, feature detection and more With real-world datasets and fully functional code, this book is your one-stop guide to understanding Computer Vision Book Description In this book, you will find several recently proposed methods in various domains of computer vision. You will start by setting up the proper Python environment to work on practical applications. This includes setting up libraries such as OpenCV, TensorFlow, and Keras using Anaconda. Using these libraries, you'll start to understand the concepts of image transformation and filtering. You will find a detailed explanation of feature detectors such as FAST and ORB; you'll use them to find similar-looking objects. With an introduction to convolutional neural nets, you will learn how to build a deep neural net using Keras and how to use it to classify the Fashion-MNIST dataset. With regard to object detection, you will learn the implementation of a simple face detector as well as the workings of complex deep-learning-based object detectors such as Faster R-CNN and SSD using TensorFlow. You'll get started with semantic segmentation using FCN models and track objects with Deep SORT. Not only this, you will also use Visual SLAM techniques such as ORB-SLAM on a standard dataset. By the end of this book, you will have a firm understanding of the different computer vision techniques and how to apply them in your applications. What you will learn Learn the basics of image manipulation with OpenCV Implement and visualize image filters such as smoothing, dilation, histogram equalization, and more Set up various libraries and platforms, such as OpenCV, Keras, and Tensorflow, in order to start using computer vision, along with appropriate datasets for each chapter, such as MSCOCO, MOT, and Fashion-MNIST Understand image transformation and downsampling with practical implementations. Explore neural networks for

computer vision and convolutional neural networks using Keras Understand working on deep-learning-based object detection such as Faster-R-CNN, SSD, and more Explore deep-learning-based object tracking in action Understand Visual SLAM techniques such as ORB-SLAM Who this book is for This book is for machine learning practitioners and deep learning enthusiasts who want to understand and implement various tasks associated with Computer Vision and image processing in the most practical manner possible. Some programming experience would be beneficial while knowing Python would be an added bonus.

Beginning Robotics with Raspberry Pi and Arduino

This book is intended for C++ developers who want to learn how to implement the main techniques of OpenCV and get started with it quickly. Working experience with computer vision / image processing is expected.

Learning OpenCV

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.

Practical OpenCV

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.

Building Computer Vision Projects with OpenCV 4 and C++

Each chapter in the book is an individual project and each project is constructed with step-by-step instructions, clearly explained code, and includes the necessary screenshots. You should have basic OpenCV and C/C++ programming experience before reading this book, as it is aimed at Computer Science graduates, researchers, and computer vision experts widening their expertise.

Learning Robotics Using Python

"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.

Learn OpenCV 4 by Building Projects

Explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard OpenCV libraries Computer Vision is a rapidly expanding area and it is becoming progressively easier for developers to make use of this field due to the ready availability of high quality libraries (such as OpenCV 2). This text is intended to facilitate the practical use of computer vision with the goal being to bridge the gap between the theory and the practical implementation of computer vision. The book will explain how to

use the relevant OpenCV library routines and will be accompanied by a full working program including the code snippets from the text. This textbook is a heavily illustrated, practical introduction to an exciting field, the applications of which are becoming almost ubiquitous. We are now surrounded by cameras, for example cameras on computers & tablets/ cameras built into our mobile phones/ cameras in games consoles; cameras imaging difficult modalities (such as ultrasound, X-ray, MRI) in hospitals, and surveillance cameras. This book is concerned with helping the next generation of computer developers to make use of all these images in order to develop systems which are more intuitive and interact with us in more intelligent ways. Explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard OpenCV libraries Offers an introduction to computer vision, with enough theory to make clear how the various algorithms work but with an emphasis on practical programming issues Provides enough material for a one semester course in computer vision at senior undergraduate and Masters levels Includes the basics of cameras and images and image processing to remove noise, before moving on to topics such as image histogramming; binary imaging; video processing to detect and model moving objects; geometric operations & camera models; edge detection; features detection; recognition in images Contains a large number of vision application problems to provide students with the opportunity to solve real problems. Images or videos for these problems are provided in the resources associated with this book which include an enhanced eBook

Computer Vision with OpenCV 3 and Qt5

Explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard OpenCV libraries Computer Vision is a rapidly expanding area and it is becoming progressively easier for developers to make use of this field due to the ready availability of high quality libraries (such as OpenCV2). This text is intended to facilitate the practical use of computer vision with the goal being to bridge the gap between the theory and the practical implementation of computer vision. The book will explain how to use the relevant OpenCV library routines and will be accompanied by a full working program including the code snippets from the text. This textbook is a heavily illustrated, practical introduction to an exciting field, the applications of which are becoming almost ubiquitous. We are now surrounded by cameras, for example cameras on computers & tablets/ cameras built into our mobile phones/ cameras in games consoles; cameras imaging difficult modalities (such as ultrasound, X-ray, MRI) in hospitals, and surveillance cameras. This book is concerned with helping the next generation of computer developers to make use of all these images in order to develop systems which are more intuitive and interact with us in more intelligent ways. Explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard OpenCV libraries Offers an introduction to computer vision, with enough theory to make clear how the various algorithms work but with an emphasis on practical programming issues Provides enough material for a one semester course in computer vision at senior undergraduate and Masters levels Includes the basics of cameras and images and image processing to remove noise, before moving on to topics such as image histogramming; binary imaging; video processing to detect and model moving objects; geometric operations & camera

models; edgedetection; features detection; recognition in images Contains a large number of vision application problems to provide students with the opportunity to solve real problems. Images or videos for these problems are provided in the resources associated with this book which include an enhanced eBook

Learn Computer Vision Using OpenCV

Explore OpenCV 4 to create visually appealing cross-platform computer vision applications

Key Features

- Understand basic OpenCV 4 concepts and algorithms
- Grasp advanced OpenCV techniques such as 3D reconstruction, machine learning, and artificial neural networks
- Work with Tesseract OCR, an open-source library to recognize text in images

Book Description

OpenCV is one of the best open source libraries available, and can help you focus on constructing complete projects on image processing, motion detection, and image segmentation. Whether you're completely new to computer vision, or have a basic understanding of its concepts, *Learn OpenCV 4 by Building Projects - Second edition* will be your guide to understanding OpenCV concepts and algorithms through real-world examples and projects. You'll begin with the installation of OpenCV and the basics of image processing. Then, you'll cover user interfaces and get deeper into image processing. As you progress through the book, you'll learn complex computer vision algorithms and explore machine learning and face detection. The book then guides you in creating optical flow video analysis and background subtraction in complex scenes. In the concluding chapters, you'll also learn about text segmentation and recognition and understand the basics of the new and improved deep learning module. By the end of this book, you'll be familiar with the basics of Open CV, such as matrix operations, filters, and histograms, and you'll have mastered commonly used computer vision techniques to build OpenCV projects from scratch.

What you will learn

- Install OpenCV 4 on your operating system
- Create CMake scripts to compile your C++ application
- Understand basic image matrix formats and filters
- Explore segmentation and feature extraction techniques
- Remove backgrounds from static scenes to identify moving objects for surveillance
- Employ various techniques to track objects in a live video
- Work with new OpenCV functions for text detection and recognition with Tesseract
- Get acquainted with important deep learning tools for image classification

Who this book is for

If you are a software developer with a basic understanding of computer vision and image processing and want to develop interesting computer vision applications with OpenCV, *Learn OpenCV 4 by Building Projects* for you. Prior knowledge of C++ will help you understand the concepts covered in this book.

Mastering OpenCV Android Application Programming

This textbook provides an accessible general introduction to the essential topics in computer vision. Classroom-tested programming exercises and review questions are also supplied at the end of each chapter.

Features:

- provides an introduction to the basic notation and mathematical concepts for describing an image and the key concepts for mapping an image into an image;
- explains the topologic and geometric basics for analysing image regions and distributions of image values and discusses identifying patterns in an image;
- introduces optic flow for representing dense motion and various topics in sparse motion analysis;
- describes special approaches for image binarization and segmentation of still images or video

frames; examines the basic components of a computer vision system; reviews different techniques for vision-based 3D shape reconstruction; includes a discussion of stereo matchers and the phase-congruency model for image features; presents an introduction into classification and learning.

Learning OpenCV 3

Each chapter in the book is an individual project and each project is constructed with step-by-step instructions, clearly explained code, and includes the necessary screenshots. You should have basic OpenCV and C/C++ programming experience before reading this book, as it is aimed at Computer Science graduates, researchers, and computer vision experts widening their expertise.

BeagleBone By Example

Unleash the power of computer vision with Python to carry out image processing and computer vision techniques About This Book Learn how to build a full-fledged image processing application using free tools and libraries Perform basic to advanced image and video stream processing with OpenCV's Python APIs Understand and optimize various features of OpenCV with the help of easy-to-grasp examples Who This Book Is For This book is for Python developers who want to perform image processing. It's ideal for those who want to explore the field of computer vision, and design and develop computer vision applications using Python. The reader is expected to have basic knowledge of Python. What You Will Learn Working with open source libraries such Pillow, Scikit-image, and OpenCV Writing programs such as edge detection, color processing, image feature extraction, and more Implementing feature detection algorithms like LBP and ORB Tracking objects using an external camera or a video file Optical Character Recognition using Machine Learning. Understanding Convolutional Neural Networks to learn patterns in images Leveraging Cloud Infrastructure to provide Computer Vision as a Service In Detail This book is a thorough guide for developers who want to get started with building computer vision applications using Python 3. The book is divided into five sections: The Fundamentals of Image Processing, Applied Computer Vision, Making Applications Smarter, Extending your Capabilities using OpenCV, and Getting Hands on. Throughout this book, three image processing libraries Pillow, Scikit-Image, and OpenCV will be used to implement different computer vision algorithms. The book aims to equip readers to build Computer Vision applications that are capable of working in real-world scenarios effectively. Some of the applications that we will look at in the book are Optical Character Recognition, Object Tracking and building a Computer Vision as a Service platform that works over the internet. Style and approach Each stage of the book elaborates on various concepts and algorithms in image processing/computer vision using Python. This step-by-step guide can be used both as a tutorial and as a reference.

OpenCV 3 Computer Vision Application Programming Cookbook

Discover interesting recipes to help you understand the concepts of object detection, image processing, and facial detection Key Features Explore the latest features and APIs in OpenCV 4 and build computer vision algorithms Develop

effective, robust, and fail-safe vision for your applications Build computer vision algorithms with machine learning capabilities Book 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 of computer vision algorithms to meet the technical requirements of your complex CV projects What you will learn Install and create a program using the OpenCV library Segment images into homogenous regions and extract meaningful objects Apply image filters to enhance image content Exploit image geometry to relay different views of a pictured scene Calibrate the camera from different image observations Detect people and objects in images using machine learning techniques Reconstruct a 3D scene from images Explore face detection using deep learning Who 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.

Computer Vision with OpenCV 3 and Qt5

Gain a working knowledge of advanced machine learning and explore Python's powerful tools for extracting data from images and videos Key Features Implement image classification and object detection using machine learning and deep learning Perform image classification, object detection, image segmentation, and other Computer Vision tasks Crisp content with a practical approach to solving real-world problems in Computer Vision Book Description Python is the ideal programming language for rapidly prototyping and developing production-grade codes for image processing and Computer Vision with its robust syntax and wealth of powerful libraries. This book will help you design and develop production-grade Computer Vision projects tackling real-world problems. With the help of this book, you will learn how to set up Anaconda and Python for the major OSes with cutting-edge third-party libraries for Computer Vision. You'll learn state-of-the-art techniques for classifying images, finding and identifying human postures, and detecting faces within videos. You will use powerful machine learning tools such as OpenCV, Dlib, and TensorFlow to build exciting projects such as classifying handwritten digits, detecting facial features, and much more. The book also covers some advanced projects, such as reading text from license plates from real-world images using Google's Tesseract software, and tracking human body poses using DeeperCut within TensorFlow. By the end of this book, you will have the expertise required to build your own Computer Vision projects using Python and its associated libraries.

What you will learn Install and run major Computer Vision packages within Python Apply powerful support vector machines for simple digit classification Understand deep learning with TensorFlow Build a deep learning classifier for general images Use LSTMs for automated image captioning Read text from real-world images Extract human pose data from images Who this book is for Python programmers and machine learning developers who wish to build exciting Computer Vision projects using the power of machine learning and OpenCV will find this book useful. The only prerequisite for this book is that you should have a sound knowledge of Python programming.

Concise Computer Vision

Filled with practical, step-by-step instructions and clear explanations for the most important and useful tasks. This book uses a very practical approach, with each recipe and their associated sample projects or examples focusing on a particular aspect of the technology. This book is intended for OpenCV developers who are interested in porting their applications to the iOS platform. Basic experience with OpenCV, computer vision, Objective C, and other iOS tools is encouraged.

Programming Computer Vision with Python

Enhance your understanding of Computer Vision and image processing by developing real-world projects in OpenCV 3 About This Book Get to grips with the basics of Computer Vision and image processing This is a step-by-step guide to developing several real-world Computer Vision projects using OpenCV 3 This book takes a special focus on working with Tesseract OCR, a free, open-source library to recognize text in images Who This Book Is For If you are a software developer with a basic understanding of Computer Vision and image processing and want to develop interesting Computer Vision applications with Open CV, this is the book for you. Knowledge of C++ is required. What You Will Learn Install OpenCV 3 on your operating system Create the required CMake scripts to compile the C++ application and manage its dependencies Get to grips with the Computer Vision workflows and understand the basic image matrix format and filters Understand the segmentation and feature extraction techniques Remove backgrounds from a static scene to identify moving objects for video surveillance Track different objects in a live video using various techniques Use the new OpenCV functions for text detection and recognition with Tesseract In Detail Open CV is a cross-platform, free-for-use library that is primarily used for real-time Computer Vision and image processing. It is considered to be one of the best open source libraries that helps developers focus on constructing complete projects on image processing, motion detection, and image segmentation. Whether you are completely new to the concept of Computer Vision or have a basic understanding of it, this book will be your guide to understanding the basic OpenCV concepts and algorithms through amazing real-world examples and projects. Starting from the installation of OpenCV on your system and understanding the basics of image processing, we swiftly move on to creating optical flow video analysis or text recognition in complex scenes, and will take you through the commonly used Computer Vision techniques to build your own Open CV projects from scratch. By the end of this book, you will be familiar with the basics of Open CV such as matrix operations, filters, and histograms, as well as more advanced concepts such as segmentation,

machine learning, complex video analysis, and text recognition. Style and approach This book is a practical guide with lots of tips, and is closely focused on developing Computer vision applications with OpenCV. Beginning with the fundamentals, the complexity increases with each chapter. Sample applications are developed throughout the book that you can execute and use in your own projects.

Learning OpenCV 3 Computer Vision with Python

Recipes to help you build computer vision applications that make the most of the popular C++ library OpenCV 3 About This Book Written to the latest, gold-standard specification of OpenCV 3 Master OpenCV, the open source library of the computer vision community Master fundamental concepts in computer vision and image processing Learn about the important classes and functions of OpenCV with complete working examples applied to real images Who This Book Is For OpenCV 3 Computer Vision Application Programming Cookbook Third Edition is appropriate for novice C++ programmers who want to learn how to use the OpenCV library to build computer vision applications. It is also suitable for professional software developers who wish to be introduced to the concepts of computer vision programming. It can also be used as a companion book for university-level computer vision courses. It constitutes an excellent reference for graduate students and researchers in image processing and computer vision. What You Will Learn Install and create a program using the OpenCV library Process an image by manipulating its pixels Analyze an image using histograms Segment images into homogenous regions and extract meaningful objects Apply image filters to enhance image content Exploit the image geometry in order to relay different views of a pictured scene Calibrate the camera from different image observations Detect people and objects in images using machine learning techniques Reconstruct a 3D scene from images In Detail Making your applications see has never been easier with OpenCV. With it, you can teach your robot how to follow your cat, write a program to correctly identify the members of One Direction, or even help you find the right colors for your redecoration. OpenCV 3 Computer Vision Application Programming Cookbook Third Edition provides a complete introduction to the OpenCV library and explains how to build your first computer vision program. You will be presented with a variety of computer vision algorithms and exposed to important concepts in image and video analysis that will enable you to build your own computer vision applications. This book helps you to get started with the library, and shows you how to install and deploy the OpenCV library to write effective computer vision applications following good programming practices. You will learn how to read and write images and manipulate their pixels. Different techniques for image enhancement and shape analysis will be presented. You will learn how to detect specific image features such as lines, circles or corners. You will be introduced to the concepts of mathematical morphology and image filtering. The most recent methods for image matching and object recognition are described, and you'll discover how to process video from files or cameras, as well as how to detect and track moving objects. Techniques to achieve camera calibration and perform multiple-view analysis will also be explained. Finally, you'll also get acquainted with recent approaches in machine learning and object classification. Style and approach This book will arm you with the basics you need to start writing world-aware applications right from a pixel level all the way

through to processing video sequences.

OpenCV 2 Computer Vision Application Programming Cookbook

Explore OpenCV 4 to create visually appealing cross-platform computer vision applications

Key Features

- Understand basic OpenCV 4 concepts and algorithms
- Grasp advanced OpenCV techniques such as 3D reconstruction, machine learning, and artificial neural networks
- Work with Tesseract OCR, an open-source library to recognize text in images

Book Description OpenCV is one of the best open source libraries available, and can help you focus on constructing complete projects on image processing, motion detection, and image segmentation. Whether you're completely new to computer vision, or have a basic understanding of its concepts, *Learn OpenCV 4 by Building Projects - Second edition* will be your guide to understanding OpenCV concepts and algorithms through real-world examples and projects. You'll begin with the installation of OpenCV and the basics of image processing. Then, you'll cover user interfaces and get deeper into image processing. As you progress through the book, you'll learn complex computer vision algorithms and explore machine learning and face detection. The book then guides you in creating optical flow video analysis and background subtraction in complex scenes. In the concluding chapters, you'll also learn about text segmentation and recognition and understand the basics of the new and improved deep learning module. By the end of this book, you'll be familiar with the basics of Open CV, such as matrix operations, filters, and histograms, and you'll have mastered commonly used computer vision techniques to build OpenCV projects from scratch.

What you will learn

- Install OpenCV 4 on your operating system
- Create CMake scripts to compile your C++ application
- Understand basic image matrix formats and filters
- Explore segmentation and feature extraction techniques
- Remove backgrounds from static scenes to identify moving objects for surveillance
- Employ various techniques to track objects in a live video
- Work with new OpenCV functions for text detection and recognition with Tesseract
- Get acquainted with important deep learning tools for image classification

Who this book is for If you are a software developer with a basic understanding of computer vision and image processing and want to develop interesting computer vision applications with OpenCV, *Learn OpenCV 4 by Building Projects* for you. Prior knowledge of C++ will help you understand the concepts covered in this book.

A Practical Introduction to Computer Vision with OpenCV

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

Hands-On GPU-Accelerated Computer Vision with OpenCV and CUDA

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.

OpenCV with Python Blueprints

A step-by-step tutorial to help you master computer vision and mobile app development. This book is for Java developers who are new to computer vision and who would like to learn about how it is used in relation to application development. It is assumed that you have previous experience in Java, but not necessarily Android. A basic understanding of image data (for example pixels and color channels) would be helpful too. You are expected to have a mobile device running Android 2.2 (Froyo) or greater and it must have a camera.

Computer Vision with Python 3

Design and develop advanced computer vision projects using OpenCV with Python About This Book Program advanced computer vision applications in Python using different features of the OpenCV library Practical end-to-end project covering an important computer vision problem All projects in the book include a step-by-step guide to create computer vision applications Who This Book Is For This book is for intermediate users of OpenCV who aim to master their skills by developing advanced practical applications. Readers are expected to be familiar with OpenCV's concepts and Python libraries. Basic knowledge of Python programming is expected and assumed. What You Will Learn Generate real-time visual effects using different filters and image manipulation techniques such as dodging and burning Recognize hand gestures in real time and perform hand-shape analysis based on the output of a Microsoft Kinect sensor Learn feature extraction and feature matching for tracking arbitrary objects of interest Reconstruct a 3D real-world scene from 2D camera motion and common camera reprojection techniques Track visually salient objects by searching for and focusing on important regions of an image Detect faces using a cascade classifier and recognize emotional expressions in human faces using multi-layer perceptrons (MLPs) Recognize street signs using a multi-class adaptation of support vector machines (SVMs) Strengthen your OpenCV2 skills and learn how to use new OpenCV3 features In Detail OpenCV

is a native cross platform C++ Library for computer vision, machine learning, and image processing. It is increasingly being adopted in Python for development. OpenCV has C++/C, Python, and Java interfaces with support for Windows, Linux, Mac, iOS, and Android. Developers using OpenCV build applications to process visual data; this can include live streaming data from a device like a camera, such as photographs or videos. OpenCV offers extensive libraries with over 500 functions This book demonstrates how to develop a series of intermediate to advanced projects using OpenCV and Python, rather than teaching the core concepts of OpenCV in theoretical lessons. Instead, the working projects developed in this book teach the reader how to apply their theoretical knowledge to topics such as image manipulation, augmented reality, object tracking, 3D scene reconstruction, statistical learning, and object categorization. By the end of this book, readers will be OpenCV experts whose newly gained experience allows them to develop their own advanced computer vision applications. Style and approach This book covers independent hands-on projects that teach important computer vision concepts like image processing and machine learning for OpenCV with multiple examples.

Mastering OpenCV 4

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 Features Explore examples to leverage the GPU processing power with OpenCV and CUDA Enhance the performance of algorithms on embedded hardware platforms Discover C++ and Python libraries for GPU acceleration Book Description 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 NVIDIA 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 learn Understand how to access GPU device properties and capabilities from CUDA programs Learn how to accelerate searching and sorting algorithms Detect shapes such as lines and circles in images Explore object tracking and detection with algorithms Process videos using different video analysis techniques in Jetson TX1 Access GPU device properties from the PyCUDA program Understand how kernel execution works Who 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 Computer Vision Programming

Recipe-based approach to tackle the most common problems in Computer Vision by leveraging the functionality of OpenCV using Python APIs

Key Features

- Build computer vision applications with OpenCV functionality via Python API
- Get to grips with image processing, multiple view geometry, and machine learning
- Learn to use deep learning models for image classification, object detection, and face recognition

Book Description 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 by providing a number of recipes that you can use to improve your applications. In this book, you will learn how to process an image by manipulating pixels and analyze an image using histograms. Then, we'll show you how to apply image filters to enhance image content and exploit the image geometry in order to relay different views of a pictured scene. We'll explore techniques to achieve camera calibration and perform a multiple-view analysis. Later, you'll work on reconstructing a 3D scene from images, converting low-level pixel information to high-level concepts for applications such as object detection and recognition. You'll also discover how to process video from files or cameras and how to detect and track moving objects. Finally, you'll get acquainted with recent approaches in deep learning and neural networks. By the end of the book, you'll be able to apply your skills in OpenCV to create computer vision applications in various domains.

What you will learn

- Get familiar with low-level image processing methods
- See the common linear algebra tools needed in computer vision
- Work with different camera models and epipolar geometry
- Find out how to detect interesting points in images and compare them
- Binarize images and mask out regions of interest
- Detect objects and track them in videos

Who this book is for This book is for developers who have a basic knowledge of Python. If you are aware of the basics of OpenCV and are ready to build computer vision systems that are smarter, faster, more complex, and more practical than the competition, then this book is for you.

Mastering OpenCV with Practical Computer Vision Projects

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, Keras, and PyTorch
- 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.

OpenCV 3 Computer Vision with Python Cookbook

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

Android Application Programming with OpenCV

This book is intended for novices, as well as seasoned Raspberry Pi and Python enthusiasts, who would like to explore the area of computer vision. Readers with very little programming or coding/scripting experience can create wonderful image processing and computer vision applications with relatively fewer lines of code in Python.

Mastering OpenCV with Practical Computer Vision Projects

Over 50 recipes to master this library of programming functions for real-time computer vision.

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