An Introduction To Opencv Using Python With Ubuntu

This is a cookbook that shows results obtained on real images with detailed explanations and the relevant screenshots. The recipes contain code accompanied with suitable explanations that will facilitate your learning. If you are a novice C++ programmer who wants to learn how to use the OpenCV library to build computer vision applications, then this cookbook is appropriate for you. It is also suitable for professional software developers wishing to be introduced to the concepts of computer vision programming. It can be used as a companion book in university-level computer vision courses. It constitutes an excellent reference for graduate students and researchers in image processing and computer vision. The book provides a good combination of basic to advanced recipes. Basic knowledge of C++ is required.

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

answering the right questions. This book walks you through the key elements of OpenCV and its powerful machine learning classes, while demonstrating how to get to grips with a range of models.

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.

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.

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.

A practical guide to understanding the core machine learning and deep learning algorithms, and implementing them to create intelligent image processing systems using OpenCV 4 Key Features Gain insights into machine learning algorithms, and implement them using OpenCV 4 and scikit-learn Get up to speed with Intel OpenVINO and its integration with OpenCV 4 Implement high-performance machine learning models with helpful tips and best practices Book Description OpenCV is an opensource library for building computer vision apps. The latest release, OpenCV 4, offers a plethora of features and platform improvements that are covered comprehensively in this up-to-date second edition. You'll start by understanding the new features and setting up OpenCV 4 to build your computer vision applications. You will explore the fundamentals of machine learning and even learn to design different algorithms that can be used for image processing. Gradually, the book will take you through supervised and unsupervised machine learning. You will gain hands-on experience using scikit-learn in Python for a variety of machine learning applications. Later chapters will focus on different machine learning algorithms, such as a decision tree, support vector machines (SVM), and Bayesian learning, and how they can be used for object detection computer vision operations. You will then delve into deep learning and ensemble learning, and discover their real-world applications, such as handwritten digit classification and gesture recognition. Finally, you'll get to grips with the latest Intel OpenVINO for building an image processing system. By the end of this book, you will have developed the skills you need to use machine learning for building intelligent computer vision applications with OpenCV 4. What you will learn Understand the core machine learning concepts for image processing Explore the theory behind machine learning and deep learning algorithm design Discover effective techniques to train your deep learning models Evaluate machine learning models to improve the performance of your models Integrate algorithms such as support vector machines and Bayes classifier in your computer vision applications Use OpenVINO with OpenCV 4 to speed up model inference Who this book is for This book is for Computer Vision professionals, machine learning developers, or anyone who wants to learn machine learning algorithms and implement them using OpenCV 4. If you want to build real-world Computer Vision and image processing applications powered by machine learning, then this book is for you. Working knowledge

of Python programming is required to get the most out of this book.

Explains the theory behind basic computer vision and providesa bridge from the theory to practical implementation using theindustry standard OpenCV libraries Computer Vision is a rapidly expanding area and it is becomingprogressively easier for developers to make use of this field dueto the ready availability of high quality libraries (such as OpenCV2). This text is intended to facilitate the practical use ofcomputer vision with the goal being to bridge the gap between thetheory and the practical implementation of computer vision. Thebook will explain how to use the relevant OpenCV library routinesand will be accompanied by a full working program including thecode snippets from the text. This textbook is a heavilyillustrated, practical introduction to an exciting field, theapplications of which are becoming almost ubiquitous. We arenow surrounded by cameras, for example cameras on computers &tablets/ cameras built into our mobile phones/ camerasin games consoles; cameras imaging difficult modalities (such asultrasound, X-ray, MRI) in hospitals, and surveillance cameras.This book is concerned with helping the next generation of computerdevelopers to make use of all these images in order to developsystems which are more intuitive and interact with us in moreintelligent ways. Explains the theory behind basic computer vision and provides abridge from the theory to practical implementation using theindustry standard OpenCV libraries Offers an introduction to computer vision, with enough theoryto make clear how the various algorithms work but with an emphasison practical programming issues Provides enough material for a one semester course in computervision at senior undergraduate and Masters levels Includes the basics of cameras and images and image processingto remove noise, before moving on to topics such as imagehistogramming; binary imaging; video processing to detect and modelmoving objects; geometric operations & camera models; edgedetection; features detection; recognition in images Contains a large number of vision application problems toprovide students with the opportunity to solve real problems.Images or videos for these problems are provided in the resourcesassociated with this book which include an enhanced eBook

Perform a wide variety of computer vision tasks such as image processing and manipulation, feature and object detection, and image restoration to build real-life computer vision applications Key Features Explore the potential of computer vision with Raspberry Pi and Python programming Perform computer vision tasks such as image processing and manipulation using OpenCV and Raspberry Pi Discover easy-to-follow examples and screenshots to implement popular computer vision techniques and applications Book Description Raspberry Pi is one of the popular single-board computers of our generation. All the major image processing and computer vision algorithms and operations can be implemented easily with OpenCV on Raspberry Pi. This updated second edition is packed with cutting-edge examples and new topics, and covers the latest versions of key technologies such as Python 3, Raspberry Pi, and OpenCV. This book will equip you with the skills required to successfully design and implement your own OpenCV, Raspberry Pi, and Python-based computer vision projects. At the start, you'll learn the basics of Python 3, and the fundamentals of single-board computers and NumPy. Next, you'll discover how to install OpenCV 4 for Python 3 on Raspberry Pi, before covering major techniques and algorithms in image processing, manipulation, and computer vision. By working through the steps in each chapter, you'll understand essential OpenCV features. Later sections will take you through

creating graphical user interface (GUI) apps with GPIO and OpenCV. You'll also learn to use the new computer vision library, Mahotas, to perform various image processing operations. Finally, you'll explore the Jupyter Notebook and how to set up a Windows computer and Ubuntu for computer vision. By the end of this book, you'll be able to confidently build and deploy computer vision apps. What you will learn Set up a Raspberry Pi for computer vision applications Perform basic image processing with libraries such as NumPy, Matplotlib, and OpenCV Demonstrate arithmetical, logical, and other operations on images Work with a USB webcam and the Raspberry Pi Camera Module Implement low-pass and high-pass filters and understand their applications in image processing Cover advanced techniques such as histogram equalization and morphological transformations Create GUI apps with Python 3 and OpenCV Perform machine learning with K-means clustering and image quantization Who this book is for This book is for beginners as well as experienced Raspberry Pi and Python 3 enthusiasts who are looking to explore the amazing world of computer vision. Working knowledge of the Python 3 programming language is assumed.

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.

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.

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.

Create image processing, object detection and face recognition apps by leveraging the power of machine learning and deep learning with OpenCV 4 and Qt 5 Key Features Gain practical insights into code for all projects covered in this book Understand modern computer vision concepts such as character recognition, image processing and modification Learn to use a graphics processing unit (GPU) and its parallel processing power for filtering images quickly Book Description OpenCV and Qt have proven to be a winning combination for developing cross-platform computer vision applications. By leveraging their power, you can create robust applications with both an intuitive graphical user interface (GUI) and high-performance capabilities. This book will help you learn through a variety of real-world projects on image processing, face and text recognition, object detection, and high-performance computing. You'll be able to progressively build on your skills by working on projects of increasing complexity. You'll begin by creating an image viewer application, building a user interface from scratch by adding menus, performing actions based on key-presses, and applying other functions. As you progress, the book will guide you through using OpenCV image processing and modification functions to edit an image with filters and transformation features. In addition to this, you'll explore the complex motion analysis and facial landmark detection algorithms, which you can use to build security and face detection applications. Finally, you'll learn to use pretrained deep learning models in OpenCV and GPUs to filter images quickly. By the end of this book, you will have learned how to effectively develop full-fledged computer vision applications with OpenCV and Qt. What you will learn Create an image viewer with all the basic requirements Construct an image editor to filter or transform images Develop a security app to detect movement and secure homes Build an app to detect facial landmarks and apply masks to faces Create an app to extract text from scanned documents and photos Train and use cascade classifiers and DL models for object detection Build an app to measure the distance between detected objects Implement high-speed image filters on GPU with Open Graphics Library (OpenGL) Who this book is for This book is for engineers and developers who are familiar with both Qt and OpenCV frameworks and are capable of creating simple projects using them, but want to build their skills to create professional-level projects using them. Familiarity with the C++ language is a must to follow the example source codes in this book.

Gain insights into image-processing methodologies and algorithms, using machine learning and neural networks in Python. This book begins with the environment setup, understanding basic image-processing terminology, and exploring Python concepts that will be useful for implementing the algorithms discussed in the book. You will then cover all the core image processing algorithms in detail before moving onto the biggest computer vision library: OpenCV. You'll see the OpenCV algorithms and how to use them for image processing. The next section

looks at advanced machine learning and deep learning methods for image processing and classification. You'll work with concepts such as pulse coupled neural networks, AdaBoost, XG boost, and convolutional neural networks for image-specific applications. Later you'll explore how models are made in real time and then deployed using various DevOps tools. All the concepts in Practical Machine Learning and Image Processing are explained using real-life scenarios. After reading this book you will be able to apply image processing techniques and make machine learning models for customized application. What You Will Learn Discover image-processing algorithms and their applications using Python Explore image processing using the OpenCV library Use TensorFlow, scikit-learn, NumPy, and other libraries Work with machine learning and deep learning algorithms for image processing Apply image-processing techniques to five real-time projects Who This Book Is For Data scientists and software developers interested in image processing and computer vision.

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.

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.

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 to 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.

OpenCV is mainly used in Computer Vision and image processing and 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. This book will be your guide to understanding the basic OpenCV concepts and algorithms.

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.

CVS, the Concurrent Versions System, is the popular source-code management tool that frees developers from the chaos that too often ensues when multiple users work on the same file. An open source technology that is available on most computer platforms, including Windows(r) and Mac OS(r) X, CVS is widely used to manage program code, web site content, and to track changes made to system configuration files. Multiple users can check out files from a directory tree, make changes, and then commit those changes back into the directory. If two developers modify the same file, CVS

enables both sets of changes to be merged together into one final file. Although CVS is a lifesaver in many development scenarios, it suffers from poor documentation. But with "Essential CVS," developers can have it all: the order that CVS brings and the comprehensive documentation developers need."Essential CVS" is a complete and easy-to-follow reference that helps programmers and system administrators apply order to the task of managing large quantities of documents. The book covers basic concepts and usage of CVS, and features a comprehensive reference for CVS commands--including a handy Command Reference Card for quick, on-the-job checks. The book also includes advanced information on all aspects of CVS that involve automation, logging, branching and merging, and "watches." Readers will find in-depth coverage of the following: Installing CVS and building your first repositoryBasic use of CVS, including importing projects, checking out projects, committing changes, and updating projectsTagging, branching and mergingWorking with multiple usersClients, operating systems, and IDEsRepository management and managing remote repositoriesProject administration, including bug tracking systems, enforcing log messages, history and annotation, and more.TroubleshootingVersion control is essential to maintaining order in any project, large or small. Any CVS user, from beginners to team leaders and system administrators, will find this practical guide to CVS indispensable in getting the most from this valuable tool.

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

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.

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

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.

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.

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 ...

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.

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

computer vision applications. Basic experience of OpenCV and Python programming is a must.
"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.
Step-by-step tutorials on deep learning neural networks for computer vision in python with Keras.
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.

"We finally have the definitive treatise on PyTorch! It covers the basics and abstractions in great detail. I hope this book becomes your extended reference document." —Soumith Chintala, co-creator of PyTorch Key Features Written by PyTorch's creator and key contributors Develop deep learning models in a familiar Pythonic way Use PyTorch to build an image classifier for cancer detection Diagnose problems with your neural network and improve training with data augmentation Purchase of the print book includes a free eBook in PDF, Kindle, and ePub formats from Manning Publications. About The Book Every other day we hear about new ways to put deep learning to good use: improved medical imaging, accurate credit card fraud detection, long range weather forecasting, and more. PyTorch puts these superpowers in your hands. Instantly familiar to anyone who knows Python data tools like NumPy and Scikit-learn, PyTorch simplifies deep learning without sacrificing advanced features. It's great for building quick models, and it scales smoothly from laptop to enterprise. Deep Learning with PyTorch teaches you to create deep learning and neural network systems with PyTorch. This practical book gets you to work right away building a tumor image classifier from scratch. After covering the basics, you'll learn best practices for the entire deep learning pipeline, tackling advanced projects as your PyTorch skills become more sophisticated. All code samples are easy to explore in downloadable Jupyter notebooks. What You Will Learn Understanding deep learning data structures such as tensors and neural networks Best practices for the PyTorch Tensor API, loading data in Python, and visualizing results Implementing modules and loss functions Utilizing pretrained models from PyTorch Hub Methods for training networks with limited inputs Sifting through unreliable results to diagnose and fix problems in your neural network Improve your results with augmented data, better model architecture, and fine tuning This Book Is Written For For Python programmers with an interest in machine learning. No experience with PyTorch or other deep learning frameworks is required. About The Authors Eli Stevens has worked in Silicon Valley for the past 15 years as a software engineer, and the past 7 years as Chief Technical Officer of a startup making medical device software. Luca Antiga is co-

founder and CEO of an AI engineering company located in Bergamo, Italy, and a regular contributor to PyTorch. Thomas Viehmann is a Machine Learning and PyTorch speciality trainer and consultant based in Munich, Germany and a PyTorch core developer. Table of Contents PART 1 - CORE PYTORCH 1 Introducing deep learning and the PyTorch Library 2 Pretrained networks 3 It starts with a tensor 4 Real-world data representation using tensors 5 The mechanics of learning 6 Using a neural network to fit the data 7 Telling birds from airplanes: Learning from images 8 Using convolutions to generalize PART 2 - LEARNING FROM IMAGES IN THE REAL WORLD: EARLY DETECTION OF LUNG CANCER 9 Using PyTorch to fight cancer 10 Combining data sources into a unified dataset 11 Training a classification model to detect suspected tumors 12 Improving training with metrics and augmentation 13 Using segmentation to find suspected nodules 14 End-to-end nodule analysis, and where to go next PART 3 - DEPLOYMENT 15 Deploying to production

Build real-world computer vision applications and develop cool demos using OpenCV for Python About This Book Learn how to apply complex visual effects to images using geometric transformations and image filters Extract features from an image and use them to develop advanced applications Build algorithms to help you understand the image content and perform visual searches Who This Book Is For This book is intended for Python developers who are new to OpenCV and want to develop computer vision applications with OpenCV-Python. This book is also useful for generic software developers who want to deploy computer vision applications on the cloud. It would be helpful to have some familiarity with basic mathematical concepts such as vectors, matrices, and so on. What You Will Learn Apply geometric transformations to images, perform image filtering, and convert an image into a cartoon-like image Detect and track various body parts such as the face, nose, eyes, ears, and mouth Stitch multiple images of a scene together to create a panoramic image Make an object disappear from an image Identify different shapes, segment an image, and track an object in a live video Recognize an object in an image and build a visual search engine Reconstruct a 3D map from images Build an augmented reality application In Detail Computer vision is found everywhere in modern technology. OpenCV for Python enables us to run computer vision algorithms in real time. With the advent of powerful machines, we are getting more processing power to work with. Using this technology, we can seamlessly integrate our computer vision applications into the cloud. Web developers can develop complex applications without having to reinvent the wheel. This book will walk you through all the building blocks needed to build amazing computer vision applications with ease. We start off with applying geometric transformations to images. We then discuss affine and projective transformations and see how we can use them to apply cool geometric effects to photos. We will then cover techniques used for object recognition, 3D reconstruction, stereo imaging, and other computer vision applications. This book will also provide clear examples written in Python to build OpenCV applications. The book starts off with simple beginner's level tasks such as basic processing and handling images, image mapping, and detecting images. It also covers popular OpenCV libraries with the help of examples. The book is a practical tutorial that covers various examples at different levels, teaching you about the different functions of OpenCV and their actual implementation. Style and approach This is a conversational-style book filled with hands-on examples that are really easy to understand. Each topic is

explained very clearly and is followed by a programmatic implementation so that the concept is solidified. Each topic contributes to something bigger in the following chapters, which helps you understand how to piece things together to build something big and complex.

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.

Apply the Processing language to tasks involved in computer vision--tasks such as edge and corner detection, recognition of motion between frames in a video, recognition of objects, matching of feature points and shapes in different frames for tracking purposes, and more. You will manipulate images through creative effects, geometric transformation, blending of multiple images, and so forth. Examples are provided. Pro Processing for Images and Computer Vision with OpenCV is a step-by-step training tool that guides you through a series of worked examples in linear order. Each chapter begins with a basic demonstration, including the code to recreate it on your own system. Then comes a creative challenge by which to engage and develop mastery of the chapter's topic. The book also includes hints and tips relating to visual arts, interaction design, and industrial best practices. This book is intended for any developer of artistic and otherwise visual applications, such as in augmented reality and digital effects, with a need to manipulate images, and to recognize and manipulate objects within those images. The book is specifically targeted at those making use of the Processing language that is common in artistic fields, and to Java programmers because of Processing's easy integration into the Java programming environment. What You'll Learn Make use of OpenCV, the open source library for computer vision in the Processing environment Capture live video streams and examine them frame-by-frame for objects in motion Recognize shapes and objects through techniques of detecting lines, edges, corners, and more Transform images by scaling, translating, rotating, and additionally through various distortion effects Apply techniques such as background subtraction to isolate motion of objects in live video streams Detect and track human faces and other objects by matching feature points in different images or video frames Who This Book Is For Media artists, designers, and creative coders

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

Build practical applications of computer vision using the OpenCV library with Python. This book discusses different facets of computer vision such as image and object detection, tracking and motion analysis and their applications with examples. The author starts with an introduction

to computer vision followed by setting up OpenCV from scratch using Python. The next section discusses specialized image processing and segmentation and how images are stored and processed by a computer. This involves pattern recognition and image tagging using the OpenCV library. Next, you'll work with object detection, video storage and interpretation, and human detection using OpenCV. Tracking and motion is also discussed in detail. The book also discusses creating complex deep learning models with CNN and RNN. The author finally concludes with recent applications and trends in computer vision. After reading this book, you will be able to understand and implement computer vision and its applications with OpenCV using Python. You will also be able to create deep learning models with CNN and RNN and understand how these cutting-edge deep learning architectures work. What You Will Learn Understand what computer vision is, and its overall application in intelligent automation systems Discover the deep learning techniques required to build computer vision applications Build complex computer vision applications using the latest techniques in OpenCV, Python, and NumPy Create practical applications and implementations such as face detection and recognition, handwriting recognition, object detection, and tracking and motion analysis Who This Book Is ForThose who have a basic understanding of machine learning and Python and are looking to learn computer vision and its applications.

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.

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.

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 NVDIA GPUs. This book provides a detailed overview of integrating OpenCV with CUDA for practical applications. To start with, you'll understand GPU programming with CUDA, an essential aspect for computer vision developers who have never worked with GPUs. You'll then move on to exploring OpenCV acceleration with GPUs and CUDA by walking through some practical examples. Once you have got to grips with the core concepts, you'll familiarize yourself with deploying OpenCV applications on NVIDIA Jetson TX1, which is popular for computer vision and deep learning applications. The last chapters of the book explain PyCUDA, a Python library that leverages the power of CUDA and GPUs for accelerations and can be used by computer vision developers who use OpenCV with Python. By the end of this book, you'll have enhanced computer vision applications with the help of this book's hands-on approach. What you will 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. 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

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