

Object Tracking Using Opencv

Build real-world Artificial Intelligence applications with Python to intelligently interact with the world around you About This Book Step into the amazing world of intelligent apps using this comprehensive guide Enter the world of Artificial Intelligence, explore it, and create your own applications Work through simple yet insightful examples that will get you up and running with Artificial Intelligence in no time Who This Book Is For This book is for Python developers who want to build real-world Artificial Intelligence applications. This book is friendly to Python beginners, but being familiar with Python would be useful to play around with the code. It will also be useful for experienced Python programmers who are looking to use Artificial Intelligence techniques in their existing technology stacks. What You Will Learn Realize different classification and regression techniques Understand the concept of clustering and how to use it to automatically segment data See how to build an intelligent recommender system Understand logic programming and how to use it Build automatic speech recognition systems Understand the basics of heuristic search and genetic programming Develop games using Artificial Intelligence Learn how reinforcement learning works Discover how to build intelligent applications centered on images, text, and time series data See how to use deep learning algorithms and build applications based on it In Detail Artificial Intelligence is becoming increasingly relevant in the modern world where everything is driven by technology and data. It is used extensively across many fields such as search engines, image recognition, robotics, finance, and so on. We will explore various real-world scenarios in this book and you'll learn about various algorithms that can be used to build Artificial Intelligence applications. During the course of this book, you will find out how to make informed decisions about what algorithms to use in a given context. Starting from the basics of Artificial Intelligence, you will learn how to develop various building blocks using different data mining techniques. You will see how to implement different algorithms to get the best possible results, and will understand how to apply them to real-world scenarios. If you want to add an intelligence layer to any application that's based on images, text, stock market, or some other form of data, this exciting book on Artificial Intelligence will definitely be your guide! Style and approach This highly practical book will show you how to implement Artificial Intelligence. The book provides multiple examples enabling you to create smart applications to meet the needs of your organization. In every chapter, we explain an algorithm, implement it, and then build a smart application.

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.

The first book of its kind dedicated to the challenge of person re-identification, this text provides an in-depth, multidisciplinary discussion of recent developments and state-of-the-art methods. Features: introduces examples of robust feature representations, reviews salient feature weighting and selection mechanisms and examines the benefits of semantic attributes; describes how to segregate meaningful body parts from background clutter; examines the use of 3D depth images and contextual constraints derived from the visual appearance of a group; reviews approaches to feature transfer function and distance metric learning and discusses potential solutions to issues of data scalability and identity inference; investigates the limitations of existing benchmark datasets, presents strategies for camera topology inference and describes techniques for improving post-rank search efficiency; explores the design rationale and implementation considerations of building a practical re-identification system.

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.

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.

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

This book focuses on the integration of intelligent communication systems, control systems and devices related to all aspects of engineering and sciences. It includes high-quality research papers from the 4th International Conference on Intelligent Communication, Control and Devices (ICICCD 2020), organized by the Department of Electronics, Instrumentation and Control Engineering at the University of Petroleum and Energy Studies, Dehradun, India during 27–28 November 2020. The topics covered are a range of recent advances in intelligent communication, intelligent control, and intelligent devices.

"This video course is a practical guide for developers who want to get started with building computer vision applications using Python 3. The video is divided into six sections: the fundamentals of image processing, applied computer vision, object detection, making applications smarter, extending your capabilities using OpenCV, getting hands on. The course will help you build computer vision applications that are capable of working in real-world scenarios effectively. Some of the applications that we look at in the course are optical character recognition, object tracking and building a computer vision as a service platform that works over the internet."--Resource description page.

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.

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.

Explore Keras, scikit-image, open source computer vision (OpenCV), Matplotlib, and a wide range of other Python tools and frameworks to solve real-world image processing problems Key Features Discover solutions to complex image processing tasks using Python tools such as scikit-image and Keras Learn popular concepts such as machine learning, deep learning, and neural networks for image processing Explore common and not-so-common challenges faced in image processing Book Description With the advancements in wireless devices and mobile technology, there's increasing demand for people with digital image processing skills in order to extract useful information from the ever-growing volume of images. This book provides comprehensive coverage of the relevant tools and algorithms, and guides you through analysis and visualization for image processing. With the help of over 60 cutting-edge recipes, you'll address common challenges in image processing and learn how to perform complex tasks such as object detection, image segmentation, and image reconstruction using large hybrid datasets. Dedicated sections will also take you through implementing various image enhancement and image restoration techniques, such as cartooning, gradient blending, and sparse dictionary learning. As you advance, you'll get to grips with face morphing and image segmentation techniques. With an emphasis on practical solutions, this book will help you apply deep learning techniques such as transfer learning

and fine-tuning to solve real-world problems. By the end of this book, you'll be proficient in utilizing the capabilities of the Python ecosystem to implement various image processing techniques effectively. What you will learn

- Implement supervised and unsupervised machine learning algorithms for image processing
- Use deep neural network models for advanced image processing tasks
- Perform image classification, object detection, and face recognition
- Apply image segmentation and registration techniques on medical images to assist doctors
- Use classical image processing and deep learning methods for image restoration
- Implement text detection in images using Tesseract, the optical character recognition (OCR) engine
- Understand image enhancement techniques such as gradient blending

Who this book is for
This book is for image processing engineers, computer vision engineers, software developers, machine learning engineers, or anyone who wants to become well-versed with image processing techniques and methods using a recipe-based approach. Although no image processing knowledge is expected, prior Python coding experience is necessary to understand key concepts covered in the book.

Enhance your programming skills to build exciting robotic projects

Key Features

- Build an intelligent robot that can detect and avoid obstacles and respond to voice commands
- Detect and track objects and faces using OpenCV
- Control your robot with a GUI button designed using Qt5

Book Description

C++ is one of the most popular legacy programming languages for robotics, and a combination of C++ and robotics hardware is used in many leading industries. This book will bridge the gap between Raspberry Pi and C/C++ programming and enable you to develop applications for Raspberry Pi. To follow along with the projects covered in the book, you can implement C programs in Raspberry Pi with the wiringPi library. With this book, you'll develop a fully functional car robot and write programs to move it in different directions. You'll then create an obstacle - avoiding robot using an ultrasonic sensor. Furthermore, you'll find out how to control the robot wirelessly using your PC/Mac. This book will also help you work with object detection and tracking using OpenCV, and guide you through exploring face detection techniques. Finally, you will create an Android app and control the robot wirelessly with an Android smartphone. By the end of this book, you will have gained experience in developing a robot using Raspberry Pi and C/C++ programming. What you will learn

- Install software in Raspberry Pi compatible with C++ programming
- Program the Raspberry Pi in C++ to run a motor
- Control RPi-powered robot wirelessly with your laptop or PC
- Program an RPi camera using OpenCV
- Control a Raspberry Pi robot with voice commands
- Implement face and object detection with Raspberry Pi

Who this book is for
This book is for developers, programmers, and robotics enthusiasts interested in leveraging C++ to build exciting robotics applications. Prior knowledge of C++ is necessary to understand the projects covered in this book.

Create powerful, accurate, and real-time Computer Vision applications using a perfect blend of algorithms and filters.

Also learn about object tracking and foreground extractions with a variety of new filters and algorithms. Key Features Filter, transform, and manipulate images using MAT class and OpenCV Framework Explore motion detection and object tracking with filters and algorithms Build object detectors using deep learning and machine learning algorithms Book Description An arena that has been positively impacted by the advancements in processing power and performance is the field of computer vision. It's only natural that over time, more and more algorithms are introduced to perform computer vision tasks more efficiently. Hands-On Algorithms for Computer Vision is a starting point for anyone who is interested in the field of computer vision and wants to explore the most practical algorithms used by professional computer vision developers. The book starts with the basics and builds up over the course of the chapters with hands-on examples for each algorithm. Right from the start, you will learn about the required tools for computer vision development, and how to install and configure them. You'll explore the OpenCV framework and its powerful collection of libraries and functions. Starting from the most simple image modifications, filtering, and transformations, you will gradually build up your knowledge of various algorithms until you are able to perform much more sophisticated tasks, such as real-time object detection using deep learning algorithms. What you will learn Get to grips with machine learning and artificial intelligence algorithms Read, write, and process images and videos Perform mathematical, matrix, and other types of image data operations Create and use histograms from back-projection images Detect motion, extract foregrounds, and track objects Extract key points with a collection of feature detector algorithms Develop cascade classifiers and use them, and train and test classifiers Employ TensorFlow object detection to detect multiple objects Who this book is for Hands-On Algorithms for Computer Vision helps those who want to learn algorithms in Computer Vision to create and customize their applications. This book will also help existing Computer Vision developers customize their applications. A basic understanding of computer vision and programming experience is needed. 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. This book provides the state-of-the-art intelligent methods and techniques for solving real-world problems along with a vision of the future research. The fifth 2020 Future Technologies Conference was organized virtually and received a total of 590 submissions from academic pioneering researchers, scientists, industrial engineers, and students from all over the world. The submitted papers covered a wide range of important topics including but not limited to computing, electronics, artificial intelligence, robotics, security and communications and their applications to the real world. After a double-blind peer review process, 210 submissions (including 6 poster papers) have been selected to be included in these proceedings. One of the meaningful and valuable dimensions of this conference is the way it brings together a large group of technology geniuses in one venue to not only present breakthrough research in future technologies, but also to promote discussions and debate of relevant issues, challenges, opportunities and research findings. The authors hope that readers find the book interesting, exciting and inspiring

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.

This volume contains the accepted papers presented during the International Conference on Research and Education in Robotics – EUROBOT Conference 2009, held in La Fert ? e-Bernard, France, May 21–23, 2009. Today, robots are indispensable tools for ?exible, automated manufacturing in many areas of industry as well as for the execution of sophisticated or d- gerous tasks in the nuclear industry, in medicine and in space technology, and last but not least, they are being increasingly used in everyday life. To further encourage research in this area, the EUROBOT Conferences have been set up. They aim to gather researchers and developers from academic ?elds and industries worldwide to explore the state of the art. This conference is - companied by the EUROBOT Contest Finals, an international amateur robotics contest open to teams of young people. During the ?nals in 2009, teams from 25 countries came together not only to compete, but also to exchange knowledge and ideas and to learn from each other. In addition to the paper and poster presentations, there were two invited talks: – Raja Chatila, Director of the LAAS – CNRS, Toulouse, France whose talk was about “Cognitive Robots” – V ?eronique Raoul, EUROBOT Association, France whose talk was about

“EUROBOT” Organizing a conference is a task that requires the collaboration of many people. We personally would like to warmly thank all members of the EUROBOT Conference2009programcommittee; without their help and dedication it would not have been possible to produce these proceedings.

Recent years have seen a vast development in various methodologies for object detection and feature extraction and recognition, both in theory and in practice. When processing images, videos, or other types of multimedia, one needs efficient solutions to perform fast and reliable processing. Computational intelligence is used for medical screening where the detection of disease symptoms is carried out, in prevention monitoring to detect suspicious behavior, in agriculture systems to help with growing plants and animal breeding, in transportation systems for the control of incoming and outgoing transportation, for unmanned vehicles to detect obstacles and avoid collisions, in optics and materials for the detection of surface damage, etc. In many cases, we use developed techniques which help us to recognize some special features. In the context of this innovative research on computational intelligence, the Special Issue “Advanced Computational Intelligence for Object Detection, Feature Extraction and Recognition in Smart Sensor Environments” present an excellent opportunity for the dissemination of recent results and achievements for further innovations and development. It is my pleasure to present this collection of excellent contributions to the research community. - Prof. Marcin Woźniak, Silesian University of Technology, Poland –

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. Learn the techniques for object recognition, 3D reconstruction, stereo imaging, and other computer vision applications using examples on different functions of OpenCV. Key Features Learn how to apply complex visual effects to images with OpenCV 3.x and Python Extract features from an image and use them to develop advanced applications Build algorithms to help you understand image content and perform visual searches Get to grips with advanced techniques in OpenCV such as machine learning, artificial neural network, 3D reconstruction, and augmented reality Book Description 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 have more processing power to work with. Using this technology, we can seamlessly integrate our computer vision applications into the cloud. Focusing on OpenCV 3.x and Python 3.6, this book will walk you through all the building blocks needed to build amazing computer vision applications with ease. We start off by manipulating images using simple filtering and geometric transformations. We then discuss affine and projective transformations and see how we can use them to apply cool advanced manipulations to your photos like resizing them while keeping the content intact or smoothly removing undesired elements. We will then cover techniques of object tracking, body part recognition, and object recognition using advanced techniques of machine learning such as artificial neural network. 3D reconstruction and augmented reality techniques are also included. The book covers popular OpenCV libraries with the help of examples. This book is a practical tutorial that covers various examples at different levels, teaching you about the different functions of OpenCV and their actual implementation. By the end of this book, you will have acquired the skills to use OpenCV and Python to develop real-world computer vision applications. What you will learn Detect shapes and edges from images and videos How to apply filters on images and videos Use different techniques to manipulate and improve images Extract and manipulate particular parts of images and videos Track objects or colors from videos Recognize specific object or faces from images and videos How to create Augmented Reality applications Apply artificial neural networks and machine learning to improve object recognition 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 and 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.

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.

Get to grips with traditional computer vision algorithms and deep learning approaches, and build real-world applications with OpenCV and other machine learning frameworks

Key Features

- Understand how to capture high-quality image data, detect and track objects, and process the actions of animals or humans
- Implement your learning in different areas of computer vision
- Explore advanced concepts in OpenCV such as machine learning, artificial neural network, and augmented reality

Book Description

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. This book will get you hands-on with a wide range of intermediate to advanced projects using the latest version of the framework and language, OpenCV 4 and Python 3.8, instead of only covering the core concepts of OpenCV in theoretical lessons. This updated second edition will guide you through working on independent hands-on projects that focus on essential OpenCV concepts such as image processing, object detection, image manipulation, object tracking, and 3D scene reconstruction, in addition to statistical learning and neural networks. You'll begin with concepts such as image filters, Kinect depth sensor, and feature matching. As you advance, you'll not only get hands-on with reconstructing and visualizing a scene in 3D but also learn to track visually salient objects. The book will help you further build on your skills by demonstrating how to recognize traffic signs and emotions on faces. Later, you'll understand how to align images, and detect and track objects using neural networks. By the end of this OpenCV Python book, you'll have gained hands-on experience and become proficient at developing advanced computer vision apps according to specific business needs. What you will learn

- Generate real-time visual effects using 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 to track arbitrary objects of interest
- Reconstruct a 3D real-world scene using 2D camera motion and camera reprojection techniques
- Detect faces using a cascade classifier and identify emotions in human faces using multilayer perceptrons
- Classify, localize, and detect objects with deep neural networks

Who this book is for This

book is for inter...

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 handwritten 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.

Step-by-step tutorials on deep learning neural networks for computer vision in python with Keras.

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.

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Get savvy with OpenCV and actualize cool computer vision applications About This Book Use OpenCV's Python bindings to capture video, manipulate images, and track objects Learn about the different functions of OpenCV and their actual implementations. Develop a series of intermediate to advanced projects using OpenCV and Python Who This Book Is For This learning path is for someone who has a working knowledge of Python and wants to try out OpenCV. This Learning Path will take you from a beginner to an expert in computer vision applications using OpenCV. OpenCV's application are humongous and this Learning Path is the best resource to get yourself acquainted thoroughly with OpenCV. What You Will Learn Install OpenCV and related software such as Python, NumPy, SciPy, OpenNI, and SensorKinect - all on Windows, Mac or Ubuntu Apply "curves" and other color transformations to simulate the look of old photos, movies, or video games Apply geometric transformations to images, perform image filtering, and convert an image into a cartoon-like image Recognize hand gestures in real time and perform hand-shape analysis based on the output of a Microsoft Kinect sensor Reconstruct a 3D real-world scene from 2D camera motion and common camera reprojection techniques Detect and recognize street signs using a cascade classifier and support vector machines (SVMs) Identify emotional expressions in human faces using convolutional neural networks (CNNs) and SVMs Strengthen your OpenCV2 skills and learn how to use new OpenCV3 features In Detail OpenCV is a state-of-art computer vision library that allows a great variety of image and video processing operations. OpenCV for Python enables us to run computer vision algorithms in real time. This learning path proposes to teach the following topics. First, we will learn how to get started with OpenCV and OpenCV3's Python API, and develop a computer vision application that tracks body parts. Then, we will build amazing intermediate-level computer vision applications such as making an object disappear from an image, identifying different shapes, reconstructing a 3D map from images , and building an augmented reality application, Finally, we'll move to more advanced projects such as hand gesture recognition, tracking visually salient objects, as well as recognizing traffic signs and emotions on faces using support vector machines and multi-layer perceptrons respectively. This Learning Path combines some of the best that Packt has to offer in one complete, curated package. It includes content from the following Packt products: OpenCV Computer Vision with Python by Joseph Howse OpenCV with Python By Example by Prateek Joshi OpenCV with Python Blueprints by Michael Beyeler Style and approach This course aims to create a smooth learning path that will teach you how to get started with will learn how to get started with OpenCV and OpenCV 3's Python API, and develop superb computer vision applications. Through this comprehensive course, you'll learn to create computer vision applications from scratch to finish and more!. Unleash the power of computer vision with Python using OpenCVAbout This Book- Create impressive applications with OpenCV and Python-Familiarize yourself with advanced machine learning concepts- Harness the power of computer vision with this easy-to-follow guideWho This Book Is ForIntended for novices to the world of OpenCV and computer vision, as well as OpenCV veterans that want to learn about what's new in OpenCV 3, this book is useful as a reference for experts and a training manual for beginners, or for anybody who wants to familiarize themselves with the concepts of object classification and detection in simple and understandable terms. Basic knowledge about Python and programming concepts is required, although the book has an easy learning curve both from a theoretical and coding point of view.What You

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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 DetailOpenCV 3 is a state-of-the-art computer vision library that allows a great variety of image and video processing operations. Some of the more spectacular and futuristic features such as face recognition or object tracking are easily achievable with OpenCV 3. Learning the basic concepts behind computer vision algorithms, models, and OpenCV's API will enable the development of all sorts of real-world applications, including security and surveillance. Starting with basic image processing operations, the book will take you through to advanced computer vision concepts. Computer vision is a rapidly evolving science whose applications in the real world are exploding, so this book will appeal to computer vision novices as well as experts of the subject wanting to learn the brand new OpenCV 3.0.0. You will build a theoretical foundation of image processing and video analysis, and progress to the concepts of classification through machine learning, acquiring the technical know-how that will allow you to create and use object detectors and classifiers, and even track objects in movies or video camera feeds. Finally, the journey will end in the world of artificial neural networks, along with the development of a hand-written digits recognition application.

Style and approachThis book is a comprehensive guide to the brand new OpenCV 3 with Python to develop real-life computer vision applications.

This book presents state-of-the-art research on artificial intelligence and blockchain for future cybersecurity applications. The accepted book chapters covered many themes, including artificial intelligence and blockchain challenges, models and applications, cyber threats and intrusions analysis and detection, and many other applications for smart cyber ecosystems. It aspires to provide a relevant reference for students, researchers, engineers, and professionals working in this particular area or those interested in grasping its diverse facets and exploring the latest advances on artificial intelligence and blockchain for future cybersecurity applications.

Eight days three gold medals three world records ... one amazing reputation firmly established. Usain Bolt's life – and the world of sport – would never be quite the same again.

"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.

Learn Computer Vision Using OpenCV With Deep Learning CNNs and RNNs Apress

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.

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.

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.

This book highlights a collection of high-quality peer-reviewed research papers presented at the Sixth International Conference on Information System Design and Intelligent Applications (INDIA 2019), held at Lendi Institute of Engineering & Technology, Vizianagaram, Andhra Pradesh, India, from 1 to 2 November 2019. It covers a wide range of topics in computer science and information technology, from wireless networks, social networks, wireless sensor networks, information and network security, to web security, Internet of Things, bioinformatics, geoinformatics and computer networks.

The two-volume set LNCS 10269 and 10270 constitutes the refereed proceedings of the 20th Scandinavian Conference on Image Analysis, SCIA 2017, held in Tromsø, Norway, in June 2017. The 87 revised papers presented were carefully reviewed and selected from 133 submissions. The contributions are structured in topical sections on history of SCIA; motion analysis and 3D vision; pattern detection and recognition; machine learning; image processing and applications; feature extraction and

segmentation; remote sensing; medical and biomedical image analysis; faces, gestures and multispectral analysis.

Learn the techniques for object recognition, 3D reconstruction, stereo imaging, and other computer vision applications using examples on different functions of OpenCV. About This Book Learn how to apply complex visual effects to images with OpenCV 3.x and Python Extract features from an image and use them to develop advanced applications Build algorithms to help you understand image content and perform visual searches Get to grips with advanced techniques in OpenCV such as machine learning, artificial neural network, 3D reconstruction, and augmented reality 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 and 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 Detect shapes and edges from images and videos How to apply filters on images and videos Use different techniques to manipulate and improve images Extract and manipulate particular parts of images and videos Track objects or colors from videos Recognize specific object or faces from images and videos How to create Augmented Reality applications Apply artificial neural networks and machine learning to improve object recognition 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 have more processing power to work with. Using this technology, we can seamlessly integrate our computer vision applications into the cloud. Focusing on OpenCV 3.x and Python 3.6, this book will walk you through all the building blocks needed to build amazing computer vision applications with ease. We start off by manipulating images using simple filtering and geometric transformations. We then discuss affine and projective transformations and see how we can use them to apply cool advanced manipulations to your photos like resizing them while keeping the content intact or smoothly removing undesired elements. We will then cover techniques of object tracking, body part recognition, and object recognition using advanced techniques of machine learning such as artificial neural network. 3D reconstruction and augmented reality techniques are also included. The book covers popular Ope ...

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.

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

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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.

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