

# Practical Python And Opencv Learn Computer Vision In A

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TensorFlow, and Matplotlib to learn Advanced algorithms for Machine Learning through a set of Practical Projects Mastering Python Learn OpenCV with Python by Examples

*Aleksei Spizhevoi Matthew Rever Joseph Howse Alberto Fernández Villán Joseph Howse Joseph Howse Dr. Menua Gevorgyan Joseph Howse James Chen Adrian Rosebrook Michael Beyeler Prateek Joshi Panchanand Jha Gabriel Garrido Calvo Mugesh S. Sunila Gollapudi Aditya Sharma Ayush Vaishya Rick van Hattem James Chen*

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

gain a working knowledge of advanced machine learning and explore python s powerful tools for extracting data from images and videos key featuresimplement image classification and object detection using machine learning and deep learningperform image classification object detection image segmentation and other computer vision tasks crisp content with a practical approach to solving real world problems in computer visionbook 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 uses 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 deeppose 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 learninstall 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

learn to capture videos manipulate images and track objects with python using the opencv library overview set up opencv its python bindings and optional kinect drivers on windows mac or ubuntu create an application that tracks and manipulates faces identify face regions using normal color images and depth images in detail computer vision can reach consumers in various contexts via webcams camera phones and gaming sensors like kinect opencv's python bindings can help developers meet these consumer demands for applications that capture images change their appearance and extract information from them in a high level language and in a standardized data format that is interoperable with scientific libraries such as numpy and scipy opencv computer vision with python is a practical hands on guide that covers the fundamental tasks of computer vision capturing filtering and analyzing images with step by step instructions for writing both an application and reusable library classes opencv computer vision with python shows you how to use the python bindings for opencv by following clear and concise examples you will develop a computer vision application that tracks faces in live video and applies special effects to them if you have always wanted to learn which version of these bindings to use how to integrate with cross platform kinect drivers and how to efficiently process image data with numpy and scipy then this book is for you what you will learn from this book install opencv and related software such as python numpy scipy openni and sensor kinect all on windows mac or ubuntu capture display and save photos and real time videos handle window events and input events using opencv's highgui module or pygame understand opencv's image format and how to perform efficient operations on opencv images with numpy and scipy apply curves and other color transformations to simulate the look of old photos movies or video games apply an effect only to edges in an image

copy and resize segments of an image apply an effect only to certain depths in an image by using data from a depth sensor such as kinect track faces eyes noses and mouths by using prebuilt datasets track arbitrary objects by creating original datasets approach a practical project based tutorial for python developers and hobbyists who want to get started with computer vision with opencv and python who this book is written for 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

create advanced applications with python and opencv exploring the potential of facial recognition machine learning deep learning web computing and augmented reality key featuresdevelop your computer vision skills by mastering algorithms in open source computer vision 4 opencv 4 and pythonapply machine learning and deep learning techniques with tensorflow and kerasdiscover the modern design patterns you should avoid when developing efficient computer vision applicationsbook 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

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

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

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 intermediate level opencv users who are looking to enhance their skills by developing advanced applications familiarity with opencv concepts and python libraries and basic knowledge of the python programming language are 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

design and develop advanced computer vision projects using opencv with python about this book program advanced computer vision applications in python using different features of the opencv library practical end to end project covering an important computer vision problem all projects in the book include a step by step guide to create computer vision applications who this book is for this book is for intermediate users of opencv who aim to master their skills by developing advanced practical applications readers are expected to be familiar with opencv s concepts and python libraries basic knowledge of python programming is expected and assumed what you will learn generate real time visual effects using different filters and image manipulation techniques such as dodging and burning recognize hand gestures in real time and perform hand shape analysis based on the output of a microsoft kinect sensor learn feature extraction and feature matching for tracking arbitrary objects of interest reconstruct a 3d real world scene from 2d camera motion and common camera reprojection techniques track visually salient objects by searching for and focusing on important regions of an image detect faces using a cascade classifier and recognize emotional expressions in human faces using multi layer peceptrons mlps recognize street signs using a multi class adaptation of support vector machines svms strengthen your opencv2 skills and learn how to use new opencv3 features in detail opencv is a native cross platform c library for computer vision machine learning and image processing it is increasingly being adopted in python for development opencv has c c python and java interfaces with support for windows linux mac ios and android developers using opencv build applications to process visual data this can include live streaming data from a device like a camera such as photographs or videos opencv offers extensive libraries with over 500 functions this book demonstrates how to develop a series of intermediate to advanced projects using opencv and python rather than teaching the core concepts of opencv in theoretical lessons instead the working projects



developed in this book teach the reader how to apply their theoretical knowledge to topics such as image manipulation augmented reality object tracking 3d scene reconstruction statistical learning and object categorization by the end of this book readers will be opencv experts whose newly gained experience allows them to develop their own advanced computer vision applications style and approach this book covers independent hands on projects that teach important computer vision concepts like image processing and machine learning for opencv with multiple examples

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 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

image processing is a technique to analyse and extract valuable information from an image using computer vision algorithms mathematically an image is nothing but two dimensional matrix and function of two coordinate x and y the x and y coordinates gives location of pixel and its value this value of pixel defines the brightness or color of an image at that location on the other hand image can also have three dimensional vector such as red green and blue rgb therefore it is quite important to have mathematical description of an image to develop further image processing algorithms these algorithms have wide range of applications such as image stitching morphing object detections recognition color filtering etc present scenario of computer vision or digital imaging has been widely adopted in various places such as security camera robotics vision movies special effects and counting the extreme use of image or video processing or one can say the major application of the image video processing algorithms is to generate special effects on movies in daily life we can find wide net of computer vision and it is keep on expanding on the other hand automobiles aircrafts drones ships and trains are equipped with computer vision automobiles using computer vision for rear parking assistance drones for surveillances and so on now a day s major use of computer vision can also be found in social network sites such as facebook google youtube lens kart etc in these sites image video processing with facial recognition algorithm is being used if someone upload a video

on youtube then it has to pass through video processing algorithm for various reasons therefore opencv plays a crucial role here for processing these images and videos in opencv library multiple algorithms and function are available to perform certain task for example any image can be resized cropped format pasting or overlapping of two images rotating flipping drawing color transformations etc can be done with simple line of code in further chapter the details of these codes are explained opencv is capable of optimizing memory handlings error handlings multi threading and re enterability these properties of opencv makes it computationally efficient and best for real time practical implementations more details of opencv can be found in the opencv official website as this project is focused on image video processing

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

be at your a game in building intelligent systems by leveraging computer vision and machine learning key features step by step instructions and code snippets for real world ml projects covers entire spectrum from basics to advanced concepts such as deep learning transfer learning and model optimization loaded with practical tips and best practices for implementing machine learning with opencv for optimising your workflow book description this book is an in depth guide that merges machine learning techniques with opencv the most popular computer vision library using python the book introduces fundamental concepts in machine learning and computer vision progressing to practical implementation with opencv concepts related to image preprocessing contour and thresholding techniques motion detection and tracking are explained in a step by step manner using code and output snippets hands on projects with real world datasets will offer you an invaluable experience in solving opencv challenges with machine learning it s an ultimate guide to explore areas like deep learning transfer learning and model optimization empowering readers to tackle complex tasks every chapter offers practical tips and tricks to build effective ml models by the end you would have mastered and applied ml concepts confidently to real world computer vision problems and will be able to develop robust and accurate machine learning models for diverse applications whether

you are new to machine learning or seeking to enhance your computer vision skills this book is an invaluable resource for mastering the integration of machine learning and computer vision using opencv and python what you will learn learn how to work with images and perform basic image processing tasks using opencv implement machine learning techniques to computer vision tasks such as image classification object detection and image segmentation work on real world projects and datasets to gain hands on experience in applying machine learning techniques with opencv explore the concepts of deep learning using tensorflow and keras and how it can be used for computer vision tasks who is this book for this book is for everyone with a basic understanding of programming and who wants to apply machine learning in computer vision using opencv and python whether you re a student researcher or developer this book will equip you with practical skills for machine learning projects some familiarity with python and machine learning concepts is assumed table of contentschapter 1 getting started with opencv chapter 2 basic image video analytics in opencv chapter 3 image processing 1 using opencv chapter 4 image processing 2 using opencv chapter 5 thresholding and contour techniques using opencv chapter 6 detect corners and road lane using opencv chapter 7 object and motion detection using opencv chapter 8 image segmentation and detecting faces using opencv chapter 9 introduction to deep learning with opencv chapter 10 advance deep learning projects with opencv chapter 11 deployment of opencv projects

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

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 featuresgain insights into machine learning algorithms and implement them using opencv 4 and scikit learnget up to speed with intel openvino and its integration with opencv 4implement high performance machine learning models with helpful tips and best practicesbook 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 model evaluate machine learning models to improve the performance of your model integrate algorithms such as support vector machines and bayes classifier in your computer vision applications use opencv 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

unlocking visual insights opencv made simple and powerful key features opencv mastery harness the full potential of opencv comprehensive coverage from fundamentals to advanced techniques practical exercises apply knowledge through hands on tasks book description mastering opencv with python immerses you in the captivating realm of computer vision with a structured approach that equips you with the knowledge and skills essential for success in this rapidly evolving field from grasping the fundamental concepts of image processing and opencv to mastering advanced techniques such as neural networks and object detection you will gain a comprehensive understanding each chapter is enriched with hands on exercises and real world projects ensuring the acquisition of practical skills that can be immediately applied in your professional journey this book not only elevates your technical proficiency but also prepares you for a rewarding career the technological job landscape is constantly evolving and professionals who can harness the potential of computer vision are in high demand by mastering the skills and insights contained within these pages you will be well prepared to explore exciting career opportunities ranging from machine learning engineering to computer vision research this book is your ticket to a future filled with innovation and professional advancement within the dynamic world of computer vision what you will learn master image processing and machine learning with opencv using advanced tools and libraries create real world projects with hands on experience explore machine learning for computer vision develop

confidence in practical computer vision projects conquer real world image processing challenges apply computer vision across diverse industries boost your career in computer vision become an expert in computer vision for career advancement who is this book for this beginner friendly book in computer vision requires no prior experience making it accessible to newcomers while a basic programming understanding is helpful it s designed to guide individuals from diverse backgrounds into the captivating realms of ai computer vision and image processing it s equally valuable for aspiring tech professionals students and enthusiasts seeking rewarding careers and knowledge in these cutting edge fields table of contents 1 introduction to computer vision 2 getting started with images 3 image processing fundamentals 4 image operations 5 image histograms 6 image segmentation 7 edges and contours 8 machine learning with images 9 advanced computer vision algorithms 10 neural networks 11 object detection using opencv 12 projects using opencv index

use advanced features of python to write high quality readable code and packages key features extensively updated for python 3 10 with new chapters on design patterns scientific programming machine learning and interactive python shape your scripts using key concepts like concurrency performance optimization asyncio and multiprocessing learn how advanced python features fit together to produce maintainable code book description even if you find writing python code easy writing code that is efficient maintainable and reusable is not so straightforward many of python s capabilities are underutilized even by more experienced programmers mastering python second edition is an authoritative guide to understanding advanced python programming so you can write the highest quality code this new edition has been extensively revised and updated with exercises four new chapters and updates up to python 3 10 revisit important basics including pythonic style and syntax and functional programming avoid common mistakes made by programmers of all experience levels make smart decisions about the best testing and debugging tools to use optimize your code s performance across multiple machines and python versions and deploy often forgotten python features to your advantage get fully up to speed with asyncio and stretch the language even further by accessing c functions with simple python calls finally turn your new and improved code



into packages and share them with the wider python community if you are a python programmer wanting to improve your code quality and readability this python book will make you confident in writing high quality scripts and taking on bigger challenges what you will learn write beautiful pythonic code and avoid common python coding mistakes apply the power of decorators generators coroutines and metaclasses use different testing systems like pytest unittest and doctest track and optimize application performance for both memory and cpu usage debug your applications with pdb werkzeug and falthandler improve your performance through asyncio multiprocessing and distributed computing explore popular libraries like dask numpy scipy pandas tensorflow and scikit learn extend python s capabilities with c c libraries and system calls who this book is for this book will benefit more experienced python programmers who wish to upskill serving as a reference for best practices and some of the more intricate python techniques even if you have been using python for years chances are that you haven t yet encountered every topic discussed in this book a good understanding of python programming is necessary

this book is a comprehensive guide to learning the basics of computer vision and machine learning using the powerful opencv library and the python programming language the book offers a practical hands on approach to learning the concepts and techniques of computer vision through practical examples all codes in this book are available on github through a series of examples the book covers a wide range of topics including image and video processing feature detection object detection and recognition machine learning and deep neural networks each chapter includes detailed explanations of the concepts and techniques involved as well as practical examples and code snippets demonstrating how to implement them in python throughout the book readers will work through hands on examples and projects learning how to build image processing applications from scratch whether you are a beginner or an experienced programmer this book provides a valuable resource for learning computer vision with opencv and python the clear and concise writing style makes it easy for readers to follow along and the numerous examples ensure that readers can practice and apply what they have learned by the end of the book readers will have a solid understanding of the fundamentals of computer vision and be

able to build their own computer vision applications with confidence this book is an excellent resource for anyone looking to learn computer vision and machine learning using the opencv library and python programming language table of contents 1 introduction 1 1 about opencv 1 2 target audients of this book 1 3 source codes for this book 1 4 hardware requirements and software versions 1 5 how this book is organized 2 installation 2 1 install on windows 2 2 install python on ubuntu 2 3 configure pycharm and install opencv 3 opencv basics 3 1 load and display images 3 2 load and display videos 3 3 display webcam 3 4 image fundamentals 3 5 draw shapes 3 6 draw texts 3 7 draw an opencv like icon 4 user interaction 4 1 mouse operations 4 2 draw circles with mouse 4 3 draw polygon with mouse 4 4 crop an image with mouse 4 5 input values with trackbars 5 image processing 5 1 conversion of color spaces 5 2 resize crop and rotate an image 5 3 adjust contrast and brightness of an image 5 4 adjust hue saturation and value 5 5 blend image 5 6 bitwise operation 5 7 warp image 5 8 blur image 5 9 histogram 6 object detection 6 1 canny edge detection 6 2 dilation and erosion 6 3 shape detection 6 4 color detection 6 5 text recognition with tesseract 6 6 human detection 6 7 face and eye detection 6 8 remove background 6 9 blur background 7 machine learning 7 1 k means clustering 7 2 k nearest neighbors 7 3 support vector machine 7 4 artificial neural network ann 7 5 convolutional neural network cnn references about the author

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