Deep Learning For Computer Vision With Python Master Deep

Deep Learning For Computer Vision With Python Master Deep Deep Learning for Computer Vision with Python Mastering the Deep This comprehensive guide delves into the exciting world of deep learning specifically focusing on its application in computer vision We will explore the foundational concepts essential libraries and practical techniques using Python empowering you to build intelligent systems capable of seeing and interpreting the world around them This guide is structured to provide a comprehensive understanding of deep learning for computer vision Each section builds upon the previous taking you from foundational concepts to advanced applications 1 to Deep Learning for Computer Vision What is Computer Vision We will define the field explore its applications across various domains and discuss the challenges faced by traditional computer vision methods Why Deep Learning This section will introduce deep learning as a revolutionary approach to computer vision emphasizing its ability to extract complex features and learn from massive datasets The Essence of Deep Neural Networks A clear explanation of how deep neural networks work including the concept of layers activation functions and the process of training Types of Deep Learning Models for Computer Vision We will introduce key architectures like Convolutional Neural Networks CNNs Recurrent Neural Networks RNNs and Generative Adversarial Networks GANs Practical Applications A glimpse into the wide range of applications including image classification object detection image segmentation facial recognition and more 2 Setting Up Your Environment Python Fundamentals A refresher on Python syntax data structures and essential libraries for data manipulation NumPy Pandas and visualization Matplotlib Installing the Right Tools Instructions on setting up your development environment including installing Python Anaconda and essential libraries like TensorFlow PyTorch and OpenCV 2 Working with Jupyter Notebooks A guide to working with Jupyter notebooks a powerful tool for interactive coding exploration and documentation 3 Essential Concepts and Techniques Image Preprocessing Understanding the importance of data preparation including image resizing normalization augmentation and data standardization Convolutional Neural Networks CNNs A deep dive into CNNs including the concepts of convolutions pooling and the role of different layer types Recurrent Neural Networks RNNs An overview of RNNs for sequence modeling particularly for applications like video analysis and action recognition Generative Adversarial Networks GANs Exploring GANs their architecture and their applications in image generation style transfer and image superresolution Loss Functions and Optimizers Understanding different loss functions used in deep learning for computer vision as well as common optimization algorithms like SGD Adam and RMSprop 4 Building Your First Deep Learning Models Image Classification with CNNs A stepbystep guide to building and training a CNN model for image classification including data loading model definition training and evaluation Object Detection with Faster RCNN Implementing a popular object detection model understanding its architecture and using it to detect objects in images Image Segmentation with UNet A practical example of

using UNet a powerful model for semantic segmentation to identify and classify different regions in images Understanding Evaluation Metrics A comprehensive discussion of common evaluation metrics used in computer vision such as accuracy precision recall and F1score 5 Advanced Deep Learning Techniques for Computer Vision Transfer Learning Leveraging pretrained models to boost performance and reduce training time a powerful technique for realworld applications Finetuning Pretrained Models Adapting pretrained models to specific tasks by finetuning their weights on your own dataset Data Augmentation Techniques for artificially expanding your dataset to improve model robustness and generalization Ensemble Methods Combining multiple models to enhance performance and reduce variance Realtime Object Detection Developing models that can process images and detect objects in realtime enabling applications like selfdriving cars and robotics 3 6 Case Studies and RealWorld Applications Medical Image Analysis Exploring the use of deep learning for medical imaging tasks such as disease diagnosis and tumor detection Selfdriving Cars Deep learning for object detection lane keeping and autonomous navigation in selfdriving vehicles Facial Recognition Building and applying deep learning models for face recognition with ethical considerations discussed Retail Analytics Using computer vision for customer behavior analysis inventory management and personalized recommendations Robotics and Automation Integrating deep learning with robotics for tasks like object grasping manipulation and navigation 7 Ethical Considerations and Future Trends Bias in Deep Learning Addressing potential biases in datasets and models ensuring fairness and ethical use Privacy and Security Discussions on the implications of deep learning for privacy and security especially with applications like facial recognition Explainability and Interpretability The importance of understanding the decisionmaking process within deep learning models Future Directions Exploring emerging trends in deep learning for computer vision including advances in 3D object recognition image generation and video understanding Conclusion This guide serves as a starting point for your journey into the fascinating world of deep learning for computer vision By mastering the fundamentals exploring practical examples and delving into advanced techniques you will be wellequipped to leverage the power of deep learning to build innovative solutions for various challenges and create a positive impact on the world

Hands-On Computer Vision with TensorFlow 2Hands-On Computer Vision with Detectron2Computer Vision Projects with OpenCV and Python 3Challenges and Applications for Implementing Machine Learning in Computer VisionMastering Computer Vision with TensorFlow 2.xComputer Vision and Recognition SystemsDeep Learning in Computer VisionBuilding Computer Vision Applications Using Artificial Neural NetworksMastering Computer Vision with PyTorch and Machine LearningRecent Advances in Computer VisionComputer VisionLearning OpenCV 5 Computer Vision with PythonOpenCV 3 Computer Vision with Python CookbookMastering Computer Vision with PyTorch 2.0Learning OpenCV 4 Computer Vision with PythonHands-On Computer Vision with OpenCV 4, Keras, and TensorFlow 2A Practical Introduction to Computer Vision with OpenCV, Enhanced EditionComputer Vision and ApplicationsNeural Network Computer Vision with OpenCV 5Computer Vision Benjamin Planche Van Vung Pham Matthew Rever Kashyap, Ramgopal Krishnendu Kar Chiranji Lal Chowdhary Mahmoud Hassaballah Shamshad Ansari Caide Xiao Mahmoud Hassaballah Roger Boyle

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a practical guide to building high performance systems for object detection segmentation video processing smartphone applications and more key featuresdiscover how to build train and serve your own deep neural networks with tensorflow 2 and kerasapply modern solutions to a wide range of applications such as object detection and video analysislearn how to run your models on mobile devices and web pages and improve their performancebook description computer vision solutions are becoming increasingly common making their way into fields such as health automobile social media and robotics this book will help you explore tensorflow 2 the brand new version of google s open source framework for machine learning you will understand how to benefit from using convolutional neural networks cnns for visual tasks hands on computer vision with tensorflow 2 starts with the fundamentals of computer vision and deep learning teaching you how to build a neural network from scratch you will discover the features that have made tensorflow the most widely used ai library along with its intuitive keras interface you ll then move on to building training and deploying cnns efficiently complete with concrete code examples the book demonstrates how to classify images with modern solutions such as inception and resnet and extract specific content using you only look once yolo mask r cnn and u net you will also build generative adversarial networks gans and variational autoencoders vaes to create and edit images and long short term memory networks lstms to analyze videos in the process you will acquire advanced insights into transfer learning data augmentation domain adaptation and mobile and web deployment among other key concepts by the end of the book you will have both the theoretical understanding and practical skills to solve advanced computer vision problems with tensorflow 2 0 what you will learncreate your own neural networks from scratchclassify images with modern architectures including inception and resnetdetect and segment objects in images with yolo mask r cnn and u nettackle problems faced when developing self driving cars and facial emotion recognition systemsboost your

application s performance with transfer learning gans and domain adaptationuse recurrent neural networks rnns for video analysisoptimize and deploy your networks on mobile devices and in the browserwho this book is for if you re new to deep learning and have some background in python programming and image processing like reading writing image files and editing pixels this book is for you even if you re an expert curious about the new tensorflow 2 features you ll find this book useful while some theoretical concepts require knowledge of algebra and calculus the book covers concrete examples focused on practical applications such as visual recognition for self driving cars and smartphone apps

explore detectron2 using cutting edge models and learn all about implementing future computer vision applications in custom domains purchase of the print or kindle book includes a free pdf ebook key features learn how to tackle common computer vision tasks in modern businesses with detectron2 leverage detectron2 performance tuning techniques to control the model s finest details deploy detectron2 models into production and develop detectron2 models for mobile devices book description computer vision is a crucial component of many modern businesses including automobiles robotics and manufacturing and its market is growing rapidly this book helps you explore detectron2 facebook s next gen library providing cutting edge detection and segmentation algorithms it s used in research and practical projects at facebook to support computer vision tasks and its models can be exported to torchscript or onnx for deployment the book provides you with step by step guidance on using existing models in detectron2 for computer vision tasks object detection instance segmentation key point detection semantic detection and panoptic segmentation you ll get to grips with the theories and visualizations of detectron2 s architecture and learn how each module in detectron2 works as you advance you ll build your practical skills by working on two real life projects preparing data training models fine tuning models and deployments for object detection and instance segmentation tasks using detectron2 finally you ll deploy detectron2 models into production and develop detectron2 applications for mobile devices by the end of this deep learning book you ll have gained sound theoretical knowledge and useful hands on skills to help you solve advanced computer vision tasks using detectron2 what you will learn build computer vision applications using existing models in detectron2 grasp the concepts underlying detectron2 s architecture and components develop real life projects for object detection and object segmentation using detectron2 improve model accuracy using detectron2 s performance tuning techniques deploy detectron2 models into server environments with ease develop and deploy detectron2 models into browser and mobile environments who this book is for if you are a deep learning application developer researcher or software developer with some prior knowledge about deep learning this book is for you to get started and develop deep learning models for computer vision applications even if you are an expert in computer vision and curious about the features of detectron2 or you would like to learn some cutting edge deep learning design patterns you will find this book helpful some html android and c programming skills are advantageous if you want to deploy computer vision applications using these platforms

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 taskscrisp 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 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 learninstall and run major computer vision packages within pythonapply powerful support vector machines for simple digit classificationunderstand deep learning with tensorflowbuild a deep learning classifier for general imagesuse lstms for automated image captioningread text from real world imagesextract human pose data from imageswho 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

machine learning allows for non conventional and productive answers for issues within various fields including problems related to visually perceptive computers applying these strategies and algorithms to the area of computer vision allows for higher achievement in tasks such as spatial recognition big data collection and image processing there is a need for research that seeks to understand the development and efficiency of current methods that enable machines to see challenges and applications for implementing machine learning in computer vision is a collection of innovative research that combines theory and practice on adopting the latest deep learning advancements for machines capable of visual processing highlighting a wide range of topics such as video segmentation object recognition and 3d modelling this publication is ideally designed for computer scientists medical professionals computer engineers information technology practitioners industry experts scholars researchers and students seeking current research on the utilization of evolving computer vision techniques

apply neural network architectures to build state of the art computer vision applications using the python programming language key featuresgain a fundamental understanding of advanced computer vision and neural network models in use todaycover tasks such as low level vision image classification and object detectiondevelop deep learning models on cloud platforms and optimize them using tensorflow lite and the openvino toolkitbook description computer vision allows machines to gain human level understanding to visualize process and analyze images and videos this book focuses on using tensorflow to help you learn advanced computer vision tasks

such as image acquisition processing and analysis you ll start with the key principles of computer vision and deep learning to build a solid foundation before covering neural network architectures and understanding how they work rather than using them as a black box next you ll explore architectures such as vgg resnet inception r cnn ssd yolo and mobilenet as you advance you ll learn to use visual search methods using transfer learning you ll also cover advanced computer vision concepts such as semantic segmentation image inpainting with gan s object tracking video segmentation and action recognition later the book focuses on how machine learning and deep learning concepts can be used to perform tasks such as edge detection and face recognition you ll then discover how to develop powerful neural network models on your pc and on various cloud platforms finally you ll learn to perform model optimization methods to deploy models on edge devices for real time inference by the end of this book you ll have a solid understanding of computer vision and be able to confidently develop models to automate tasks what you will learnexplore methods of feature extraction and image retrieval and visualize different layers of the neural network modeluse tensorflow for various visual search methods for real world scenariosbuild neural networks or adjust parameters to optimize the performance of modelsunderstand tensorflow deeplab to perform semantic segmentation on images and dcgan for image inpaintingevaluate your model and optimize and integrate it into your application to operate at scaleget up to speed with techniques for performing manual and automated image annotationwho this book is for this book is for computer vision professionals image processing professionals machine learning engineers and ai developers who have some knowledge of machine learning and deep learning and want to build expert level computer vision applications in addition to familiarity with tensorflow python knowledge will be required to get started with this book

this cutting edge volume focuses on how artificial intelligence can be used to give computers the ability to imitate human sight with contributions from researchers in diverse countries including thailand spain japan turkey australia and india the book explains the essential modules that are necessary for comprehending artificial intelligence experiences to provide machines with the power of vision the volume also presents innovative research developments applications and current trends in the field the chapters cover such topics as visual quality improvement parkinson s disease diagnosis hypertensive retinopathy detection through retinal fundus big image data processing n grams for image classification medical brain images chatbot applications credit score improvisation vision based vehicle lane detection damaged vehicle parts recognition partial image encryption of medical images and image synthesis the chapter authors show different approaches to computer vision image processing and frameworks for machine learning to build automated and stable applications deep learning is included for making immersive application based systems pattern recognition and biometric systems the book also considers efficiency and comparison at various levels of using algorithms for real time applications processes and analysis

deep learning algorithms have brought a revolution to the computer vision community by introducing non traditional and efficient solutions to several image related problems that had long remained unsolved or partially addressed this book presents a collection of eleven chapters where each individual chapter explains the deep learning principles of a specific topic introduces reviews of up to date techniques and presents research findings to

the computer vision community the book covers a broad scope of topics in deep learning concepts and applications such as accelerating the convolutional neural network inference on field programmable gate arrays fire detection in surveillance applications face recognition action and activity recognition semantic segmentation for autonomous driving aerial imagery registration robot vision tumor detection and skin lesion segmentation as well as skin melanoma classification the content of this book has been organized such that each chapter can be read independently from the others the book is a valuable companion for researchers for postgraduate and possibly senior undergraduate students who are taking an advanced course in related topics and for those who are interested in deep learning with applications in computer vision image processing and pattern recognition

apply computer vision and machine learning concepts in developing business and industrial applications using a practical step by step approach the book comprises four main sections starting with setting up your programming environment and configuring your computer with all the prerequisites to run the code examples section 1 covers the basics of image and video processing with code examples of how to manipulate and extract useful information from the images you will mainly use opencv with python to work with examples in this section section 2 describes machine learning and neural network concepts as applied to computer vision you will learn different algorithms of the neural network such as convolutional neural network cnn region based convolutional neural network r cnn and yolo in this section you will also learn how to train tune and manage neural networks for computer vision section 3 provides step by step examples of developing business and industrial applications such as facial recognition in video surveillance and surface defect detection in manufacturing the final section is about training neural networks involving a large number of images on cloud infrastructure such as amazon aws google cloud platform and microsoft azure it walks you through the process of training distributed neural networks for computer vision on gpu based cloud infrastructure by the time you finish reading building computer vision applications using artificial neural networks and working through the code examples you will have developed some real world use cases of computer vision with deep learning what you will learn employ image processing manipulation and feature extraction techniques work with various deep learning algorithms for computer vision train manage and tune hyperparameters of cnns and object detection models such as r cnn ssd and yolo build neural network models using keras and tensorflow discover best practices when implementing computer vision applications in business and industry train distributed models on gpu based cloud infrastructure who this book is for data scientists analysts and machine learning and software engineering professionals with python programming knowledge

this book is a valuable resource for professionals researchers and students who want to expand their knowledge of advanced computer vision techniques using pytorch

this book presents a collection of high quality research by leading experts in computer vision and its applications each of the 16 chapters can be read independently and discusses the principles of a specific topic reviews up to date techniques presents outcomes and highlights the challenges and future directions as such the book explores the latest trends in fashion creative processes facial features detection visual odometry transfer learning face

recognition feature description plankton and scene classification video face alignment video searching and object segmentation it is intended for postgraduate students researchers scholars and developers who are interested in computer vision and connected research disciplines and is also suitable for senior undergraduate students who are taking advanced courses in related topics however it is also provides a valuable reference resource for practitioners from industry who want to keep abreast of recent developments in this dynamic exciting and profitable research field

updated for opencv 5 this book covers the latest on depth cameras 3d navigation deep neural networks and cloud computing helping you solve real world computer vision problems with practical codekey features build powerful computer vision applications in concise code with opencv 5 and python 3 learn the fundamental concepts of image processing object classification and 2d and 3d tracking train use and understand machine learning models and deploy them in the cloudbook descriptioncomputer vision is a rapidly evolving science in the field of artificial intelligence encompassing diverse use cases 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 5 and python 3 you ll start by setting up opencv 5 with python 3 on various platforms next you ll learn how to perform basic operations such as reading writing manipulating and displaying images videos and camera feeds from taking you through image processing video analysis 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 you ll tackle two popular challenges face detection and face recognition you ll also learn about object classification and machine learning which will enable you to create and use object detectors and even track moving objects in real time later you ll develop your skills in augmented reality and real world 3d navigation finally you ll cover anns and dnns learning how to develop apps for recognizing handwritten digits and classifying a person s gender and age and you ll deploy your solutions to the cloud 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 5 s python 3 bindings understand image processing and video analysis 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 augmented reality applications and navigate the real 3d world train neural networks and deploy them as cloud based solutionswho this book is forthis opencv book is a good fit for python programmers who want to get started with computer vision and machine learning this book will also be useful for computer vision and ai ml developers who want to expand their opencv skills as well as experts who want to stay up to date with opencv 5

opencv 3 is a native cross platform library for computer vision machine learning and image processing this book will help you tackle increasingly challenging computer vision problems by providing number of recipes that you can use to improvise your existing applications in this book you will learn how to process an image by manipulating pixels and analyze an image using histograms we ll guide you through segmenting images into homogeous regions and extracting meaningful objects then you ll learn 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 multiple view analysis later you ll work on converting low level pixel information to high level concepts for applications such as object detection recognition and scene monitoring you ll 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 object classification and neural networks by the end of the book you ll be able to apply your skills in opencv to create and explore computer vision applications in various domains

tagline unleashing the power of computer vision with pytorch 2 0 key features covers core to advanced computer vision topics with pytorch 2 0 s latest features and best practices progressive learning path to ensure suitability for beginners and experts alike tackles practical tasks like optimization transfer learning and edge deployment description in an era where computer vision has rapidly transformed industries like healthcare and autonomous systems pytorch 2 0 has become the leading framework for high performance ai solutions mastering computer vision with pytorch 2 0 bridges the gap between theory and application guiding readers through pytorch essentials while equipping them to solve real world challenges starting with pytorch s evolution and unique features the book introduces foundational concepts like tensors computational graphs and neural networks it progresses to advanced topics such as convolutional neural networks cnns transfer learning and data augmentation hands on chapters focus on building models optimizing performance and visualizing architectures specialized areas include efficient training with pytorch lightning deploying models on edge devices and making models production ready explore cutting edge applications from object detection models like yolo and faster r cnn to image classification architectures like resnet and inception by the end readers will be confident in implementing scalable ai solutions staying ahead in this rapidly evolving field whether you re a student ai enthusiast or professional this book empowers you to harness the power of pytorch 2 0 for computer vision what will you learn build and train neural networks using pytorch 2 0 implement advanced image classification and object detection models optimize models through augmentation transfer learning and fine tuning deploy scalable ai solutions in production and on edge devices master pytorch lightning for efficient training workflows apply real world techniques for preprocessing quantization and deployment who is this book for this book is tailored for students professionals researchers and ai enthusiasts keen to explore computer vision with pytorch 2 0 a basic understanding of python and machine learning concepts is required familiarity with neural networks will enhance the learning experience table of contents 1 diving into pytorch 2 0 2 pytorch basics 3 transitioning from pytorch 1 x to pytorch 2 0 4 venturing into artificial neural networks 5 diving deep into convolutional neural networks cnns 6 data augmentation and preprocessing for vision tasks 7 exploring transfer learning with pytorch 8 advanced image classification models 9 object detection models 10 tips and tricks to improve model performance 11 efficient training with pytorch lightning 12 model deployment and production ready considerations index

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

build your own computer vision deep learning classifiers about this video gain a solid understanding of core computer vision concepts using opencv and utilize deep learning to create advanced computer vision models learn quickly without being bogged down by complex mathematical theory use the latest libraries including the latest version of opencv 4 keras and tensorflow 2 0 all running on python 3 8 in detail do you want to understand how computers see images and videos using artificial intelligence we can enable computers and smart devices to interpret what is in an image computer vision this can provide massive benefits when it comes to automating tasks for which images are vital such as examining medical images or enabling self driving cars to see already these applications are creating a massive industry around computer vision one that is set to grow rapidly with some sources predicting that it will be worth over 43 billion by 2023 this course provides you with a perfect foundation from which to understand computer vision and supports your professional development in this fast growing arena we first learn the basic concepts and explore these

using opencv4 the most popular open source computer vision library next we explore using machine learning in computer vision including the use of deep learning using tensorflow 2 0 and keras to implement advanced image classifiers this course is designed to help data scientists and those who already have some familiarity with ml and dl and experience with python keras and tensorflow to gain a solid understanding of opencv and train their own computer vision deep learning models

explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard opencv libraries computer vision is a rapidly expanding area and it is becoming progressively easier for developers to make use of this field due to the ready availability of high quality libraries such as opencv 2 this text is intended to facilitate the practical use of computer vision with the goal being to bridge the gap between the theory and the practical implementation of computer vision the book will explain how to use the relevant opencv library routines and will be accompanied by a full working program including the code snippets from the text this textbook is a heavily illustrated practical introduction to an exciting field the applications of which are becoming almost ubiquitous we are now surrounded by cameras for example cameras on computers tablets cameras built into our mobile phones cameras in games consoles cameras imaging difficult modalities such as ultrasound x ray mri in hospitals and surveillance cameras this book is concerned with helping the next generation of computer developers to make use of all these images in order to develop systems which are more intuitive and interact with us in more intelligent ways explains the theory behind basic computer vision and provides a bridge from the theory to practical implementation using the industry standard opencv libraries offers an introduction to computer vision with enough theory to make clear how the various algorithms work but with an emphasis on practical programming issues provides enough material for a one semester course in computer vision at senior undergraduate and masters levels includes the basics of cameras and images and image processing to remove noise before moving on to topics such as image histogramming binary imaging video processing to detect and model moving objects geometric operations camera models edge detection features detection recognition in images contains a large number of vision application problems to provide students with the opportunity to solve real problems images or videos for these problems are provided in the resources associated with this book which include an enhanced ebook

cd rom contains searchable version of text with hyperlinks

unlocking computer vision with python and opencv key features practical solutions to image processing challenges detect and classify objects in images recognize faces and text from images using character detection and recognition models description neural network computer vision with opencv equips you with professional skills and knowledge to build intelligent vision systems using opencv it creates a sequential pathway for understanding morphological operations edge and corner detection object localization image classification segmentation and advanced applications like face detection and recognition and optical character recognition this book offers a practical roadmap to explore the nuances of image processing with detailed discussions on each topic supported by hands on python code examples the readers will learn the basics of neural networks deep learning and cnns by

using deep learning frameworks like keras tensorflow pytorch caffe etc they will be able to utilize opencv dnn module to classify images by using models like inception v3 resnet 101 mobilenet v2 moreover the book will help to successfully implement object detection using yolov3 ssd and r cnn models the character detection and recognition models are also covered in depth with code examples you will gain a deeper understanding of how these techniques impact real world scenarios and learn to harness the potential of python and opencv to solve complex problems whether you are building intelligent systems automating processes or working on image related projects this book equips you with the skills to revolutionize your approach to visual data what you will learn acquire expertise in image manipulation techniques apply knowledge to practical scenarios in computer vision implement robust systems for face detection and recognition enhance projects with accurate object localization capabilities extract text information from images effectively who this book is for this book is designed for those with basic python skills from beginners to intermediate level readers whether you are building intelligent robots that perceive their surroundings or crafting advanced vision systems for object detection and image analysis this book will equip you with the tools and skills to push the boundaries of ai perception table of contents 1 introduction to computer vision 2 basics of imaging 3 challenges in computer vision 4 classical solutions 5 deep learning and cnns 6 opencv dnn module 7 modern solutions for image classification 8 modern solutions for object detection 9 faces and text 10 running the code 11 end to end demo

for upper level courses in computer vision and image analysis provides necessary theory and examples for students and practitioners who will work in fields where significant information must be extracted automatically from images appropriate for those interested in multimedia art and design geographic information systems and image databases in addition to the traditional areas of automation image science medical imaging remote sensing and computer cartography the text provides a basic set of fundamental concepts and algorithms for analyzing images and discusses some of the exciting evolving application areas of computer vision

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Introduction

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