An Introduction To Object Recognition Selected Al

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An Introduction To Object Recognition Selected Al ***2021-07-21***

RILEY KLINE

2D Object Detection and Recognition Springer Nature At?rstsight,thisbookisabou tfacerecognitioninthebrain .Itsmorelasting value,

however,lies in the paradigmatic way in which this particular problem is treated. From the basic ideas that are worked out here in concrete detail, it is a naturaland simple next step to at leastimagine, if not realizein model form, much more generalstructures and processes,thus helping to bridge the still tremendous chasm between mind and brain. It is the purpose of this foreword to point out these generic traits. For centuries, thinking about the brain has been dominated by the most complexmechanisticdevic esofthetime,clockwork,co mmunicatinghydraulic tubesor,today,thecompute r.Thecomputer,takenasinc arnationoftheU- versal Turing Machine, can implement any conceivable process, so that also a functional brain can surely be simulated on it, an idea that, beginning in the ?fties of the last century, has been seducing scientists to create “art- cial intelligence” in the computer. As a result we now have an information technology that displays many functional capabilities formerly regarded as the exclusive domain of the mind. As fascinating as this is, doting on “int- ligent machines” is systematically diverting our attention awayfrom the true problems of understanding the working of the brain.

Object Recognition

Springer

Images play a crucial role in shaping and reflecting political life. Digitization has vastly increased the

presence of such images in daily life, creating valuable new research opportunities for social scientists. We show how recent innovations in computer vision methods can substantially lower the costs of using images as data. We introduce readers to the deep learning algorithms commonly used for object recognition, facial recognition, and visual sentiment analysis. We then provide guidance and specific instructions for scholars interested in using these methods in their own research.

Epipolar Geometry in Stereo, Motion and Object Recognition Springer Science & Business Media

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

Images as Data for Social Science Research Springer Nature

Brain damage can lead to selective problems with visual perception, including visual agnosia- the inability to recognize objects even though elementary visual functions remain unimpaired. Visual Agnosia reviews all the recent records of this disorder, places these 100 or so case studies in the general context of current neuroscience, and draws relevant conclusions about the organization of normal visual processing.

A Guide to Convolutional Neural Networks for Computer Vision Springer Science & Business Media

The detection and recognition of objects in images is a key research topic in the computer

vision community. Within this area, face recognition and interpretation has attracted increasing attention owing to the possibility of unveiling human perception mechanisms, and for the development of practical biometric systems. This book and the accompanying website, focus on template matching, a subset of object recognition techniques of wide applicability, which has proved to be particularly effective for face recognition applications. Using examples from face processing tasks throughout the book to illustrate more general object recognition approaches, Roberto Brunelli: examines the basics of digital image formation, highlighting points critical to the task of template matching; presents basic and advanced template matching techniques, targeting grey-level images, shapes and point sets; discusses recent pattern classification paradigms from a template matching perspective; illustrates the development of a real face recognition system; explores the use of advanced computer graphics techniques in the development of computer vision algorithms. Template Matching Techniques in Computer Vision is primarily aimed at practitioners working on the development of systems for effective object recognition such as biometrics, robot navigation, multimedia retrieval and landmark detection. It is also of interest to graduate

students undertaking studies in these areas.

Medical Image Recognition, Segmentation and Parsing

Springer

One of the grand challenges of artificial intelligence is to enable computers to interpret 3D scenes and objects from imagery. This book organizes and introduces major concepts in 3D scene and object representation and inference from still images, with a focus on recent efforts to fuse models of geometry and perspective with statistical machine learning. The book is organized into three sections: (1) Interpretation of Physical Space; (2) Recognition of 3D Objects; and (3) Integrated 3D Scene Interpretation. The first discusses representations of spatial layout and techniques to interpret physical scenes from images. The second section introduces representations for 3D object categories that account for the intrinsically 3D nature of objects and provide robustness to change in viewpoints. The third section discusses strategies to unite inference of scene geometry and object pose and identity into a coherent scene interpretation. Each section broadly surveys important ideas from cognitive science and artificial intelligence research, organizes and discusses key concepts and techniques from recent work in computer vision, and describes a few sample approaches in

detail. Newcomers to computer vision will benefit from introductions to basic concepts, such as single-view geometry and image classification, while experts and novices alike may find inspiration from the book's organization and discussion of the most recent ideas in 3D scene understanding and 3D object recognition. Specific topics include: mathematics of perspective geometry; visual elements of the physical scene, structural 3D scene representations; techniques and features for image and region categorization; historical perspective, computational models, and datasets and machine learning techniques for 3D object recognition; inferences of geometrical attributes of objects, such as size and pose; and probabilistic and feature-passing approaches for contextual reasoning about 3D objects and scenes. Table of Contents: Background on 3D Scene Models / Single-view Geometry / Modeling the Physical Scene / Categorizing Images and Regions / Examples of 3D Scene Interpretation / Background on 3D Recognition / Modeling 3D Objects / Recognizing and Understanding 3D Objects / Examples of 2D 1/2 Layout Models / Reasoning about Objects and Scenes / Cascades of Classifiers / Conclusion and Future Directions

Object Detection and Recognition in Digital Images Springer Science & Business Media

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.

Deep Learning in Object Detection and Recognition Springer 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 LearnDiscover 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.

Practical Machine Learning and Image Processing Academic Press

Across three volumes, the Handbook of Image Processing and Computer Vision presents a comprehensive review of the full range of topics that comprise the field of computer vision, from the acquisition of signals and formation of images, to learning techniques for scene understanding. The authoritative insights presented within cover all aspects of the sensory subsystem required by an intelligent system to perceive the environment and act autonomously. Volume 3 (From Pattern to Object) examines object recognition, neural networks, motion analysis, and 3D reconstruction of a scene. Topics and features: •

Describes the fundamental processes in the field of artificial vision that enable the formation of digital images from light energy • Covers light propagation, color perception, optical systems, and the analog-to-digital conversion of the signal • Discusses the information recorded in a digital image, and the image processing algorithms that can improve the visual qualities of the image • Reviews boundary extraction algorithms, key linear and geometric transformations, and techniques for image restoration • Presents a selection of different image segmentation algorithms, and of widely-used algorithms for the automatic detection of points of interest • Examines important algorithms for object recognition, texture analysis, 3D reconstruction, motion analysis, and camera calibration • Provides an introduction to four significant types of neural network, namely RBF, SOM, Hopfield, and deep neural networks This all-encompassing survey offers a complete reference for all students, researchers, and practitioners involved in developing intelligent machine vision systems. The work is also an invaluable resource for professionals within the IT/software and electronics industries involved in machine vision, imaging, and artificial intelligence. Dr. Cosimo Distante is a Research Scientist in Computer Vision and Pattern Recognition in the

Institute of Applied Sciences and Intelligent Systems (ISAI) at the Italian National Research Council (CNR). Dr. Arcangelo Distante is a researcher and the former Director of the Institute of Intelligent Systems for Automation (ISSIA) at the CNR. His research interests are in the fields of Computer Vision, Pattern Recognition, Machine Learning, and Neural Computation.

Computer Vision and Image Processing John Wiley & Sons

This practical book shows you how to employ machine learning models to extract information from images. ML engineers and data scientists will learn how to solve a variety of image problems including classification, object detection, autoencoders, image generation, counting, and captioning with proven ML techniques. This book provides a great introduction to end-to-end deep learning: dataset creation, data preprocessing, model design, model training, evaluation, deployment, and interpretability. Google engineers Valliappa Lakshmanan, Martin Görner, and Ryan Gillard show you how to develop accurate and explainable computer vision ML models and put them into large-scale production using robust ML architecture in a flexible and maintainable way. You'll learn how to design, train, evaluate, and predict with models written in TensorFlow or Keras. You'll learn how to: Design ML architecture for computer vision tasks

Select a model (such as ResNet, SqueezeNet, or EfficientNet) appropriate to your task Create an end-to-end ML pipeline to train, evaluate, deploy, and explain your model Preprocess images for data augmentation and to support learnability Incorporate explainability and responsible AI best practices Deploy image models as web services or on edge devices Monitor and manage ML models

Handbook of Image Processing and Computer Vision

Springer Science & Business Media

This book describes the technical problems and solutions for automatically recognizing and parsing a medical image into multiple objects, structures, or anatomies. It gives all the key methods, including state-of- the-art approaches based on machine learning, for recognizing or detecting, parsing or segmenting, a cohort of anatomical structures from a medical image. Written by top experts in Medical Imaging, this book is ideal for university researchers and industry practitioners in medical imaging who want a complete reference on key methods, algorithms and applications in medical image recognition, segmentation and parsing of multiple objects. Learn: Research challenges and problems in medical image recognition, segmentation and parsing of multiple objects Methods and theories for medical image recognition, segmentation and parsing of multiple objects Efficient and effective

machine learning solutions based on big datasets Selected applications of medical image parsing using proven algorithms Provides a comprehensive overview of state-of-the-art research on medical image recognition, segmentation, and parsing of multiple objects Presents efficient and effective approaches based on machine learning paradigms to leverage the anatomical context in the medical images, best exemplified by large datasets Includes algorithms for recognizing and parsing of known anatomies for practical applications

Representations and Techniques for 3D Object Recognition and Scene Interpretation "O'Reilly Media, Inc."

A modern treatment focusing on learning and inference, with minimal prerequisites, real-world examples and implementable algorithms.

An Introduction to 3D Computer Vision Techniques and Algorithms Mit Press

Develop and optimize deep learning models with advanced architectures. This book teaches you the intricate details and subtleties of the algorithms that are at the core of convolutional neural networks. In Advanced Applied Deep Learning, you will study advanced topics on CNN and object detection using Keras and TensorFlow. Along the way, you will look at the fundamental operations in CNN, such as convolution and pooling, and then look at more advanced

architectures such as inception networks, resnets, and many more. While the book discusses theoretical topics, you will discover how to work efficiently with Keras with many tricks and tips, including how to customize logging in Keras with custom callback classes, what is eager execution, and how to use it in your models. Finally, you will study how object detection works, and build a complete implementation of the YOLO (you only look once) algorithm in Keras and TensorFlow. By the end of the book you will have implemented various models in Keras and learned many advanced tricks that will bring your skills to the next level. What You Will Learn See how convolutional neural networks and object detection workSave weights and models on diskPause training and restart it at a later stage Use hardware acceleration (GPUs) in your codeWork with the Dataset TensorFlow abstraction and use pre-trained models and transfer learningRemove and add layers to pre-trained networks to adapt them to your specific projectApply pre-trained models such as Alexnet and VGG16 to new datasets Who This Book Is For Scientists and researchers with intermediate-to-advanced Python and machine learning know-how. Additionally, intermediate knowledge of Keras and TensorFlow is expected.

Object Recognition, Attention, and Action

Morgan & Claypool Publishers

Human object recognition is a classical topic both for philosophy and for the natural sciences. Ultimately, understanding of object recognition will be promoted by the cooperation of behavioral research, neurophysiology, and computation. This original book provides an excellent introduction to the issues that are involved. It contains chapters that address the ways in which humans and machines attend to, recognize, and act toward objects in the visual environment. Optimization for Computer Vision Springer Science & Business Media Across three volumes, the Handbook of Image Processing and Computer Vision presents a comprehensive review of the full range of topics that comprise the field of computer vision, from the acquisition of signals and formation of images, to learning techniques for scene understanding. The authoritative insights presented within cover all aspects of the sensory subsystem required by an intelligent system to perceive the environment and act autonomously. Volume 2 (From Image to Pattern) examines image transforms, image restoration, and image segmentation. Topics and features: • Describes the fundamental processes in the field of artificial vision that enable the formation of digital images from light energy • Covers light propagation, color perception, optical systems, and the analog-to-digital conversion of the signal • Discusses the information recorded in a

digital image, and the image processing algorithms that can improve the visual qualities of the image • Reviews boundary extraction algorithms, key linear and geometric transformations, and techniques for image restoration • Presents a selection of different image segmentation algorithms, and of widely-used algorithms for the automatic detection of points of interest • Examines important algorithms for object recognition, texture analysis, 3D reconstruction, motion analysis, and camera calibration • Provides an introduction to four significant types of neural network, namely RBF, SOM, Hopfield, and deep neural networks This all-encompassing survey offers a complete reference for all students, researchers, and practitioners involved in developing intelligent machine vision systems. The work is also an invaluable resource for professionals within the IT/software and electronics industries involved in machine vision, imaging, and artificial intelligence. Dr. Cosimo Distante is a Research Scientist in Computer Vision and Pattern Recognition in the Institute of Applied Sciences and Intelligent Systems (ISAI) at the Italian National Research Council (CNR). Dr. Arcangelo Distante is a researcher and the former Director of the Institute of Intelligent Systems for Automation (ISSIA) at the CNR. His research interests are in the fields

of Computer Vision, Pattern Recognition, Machine Learning, and Neural Computation.

Object Recognition, Attention, and Action

New Age International

This practical and authoritative text/reference presents a broad introduction to the optimization methods used specifically in computer vision. In order to facilitate understanding, the presentation of the methods is supplemented by simple flow charts, followed by pseudocode implementations that reveal deeper insights into their mode of operation. These discussions are further supported by examples taken from important applications in computer vision. Topics and features: provides a comprehensive overview of computer vision-related optimization; covers a range of techniques from classical iterative multidimensional optimization to cutting-edge topics of graph cuts and GPU-suited total variation-based optimization; describes in detail the optimization methods employed in computer vision applications; illuminates key concepts with clearly written and step-by-step explanations; presents detailed information on implementation, including pseudocode for most methods.

Computer Vision

Cambridge University Press

Computer vision has become increasingly important and effective in recent years due to its wide-ranging applications

in areas as diverse as smart surveillance and monitoring, health and medicine, sports and recreation, robotics, drones, and self-driving cars. Visual recognition tasks, such as image classification, localization, and detection, are the core building blocks of many of these applications, and recent developments in Convolutional Neural Networks (CNNs) have led to outstanding performance in these state-of-the-art visual recognition tasks and systems. As a result, CNNs now form the crux of deep learning algorithms in computer vision. This self-contained guide will benefit those who seek to both understand the theory behind CNNs and to gain hands-on experience on the application of CNNs in computer vision. It provides a comprehensive introduction to CNNs starting with the essential concepts behind neural networks: training, regularization, and optimization of CNNs. The book also discusses a wide range of loss functions, network layers, and popular CNN architectures, reviews the different techniques for the evaluation of CNNs, and presents some popular CNN tools and libraries that are commonly used in computer vision. Further, this text describes and discusses case studies that are related to the application of CNN in computer vision, including image classification, object detection, semantic segmentation, scene understanding, and image

generation. This book is ideal for undergraduate and graduate students, as no prior background knowledge in the field is required to follow the material, as well as new researchers, developers, engineers, and practitioners who are interested in gaining a quick understanding of CNN models.

Moving Object Detection Using Background Subtraction Apress

Conceptualizing deep learning in computer vision applications using PyTorch and Python libraries. KEY FEATURES ● Covers a variety of computer vision projects, including face recognition and object recognition such as Yolo, Faster R-CNN. ● Includes graphical representations and illustrations of neural networks and teaches how to program them. ● Includes deep learning techniques and architectures introduced by Microsoft, Google, and the University of Oxford. DESCRIPTION Elements of Deep Learning for Computer Vision gives a thorough understanding of deep learning and provides highly accurate computer vision solutions while using libraries like PyTorch. This book introduces you to Deep Learning and explains all the concepts required to understand the basic working, development, and tuning of a neural network using Pytorch. The book then addresses the field of computer vision using two libraries, including the Python wrapper/version of OpenCV and PIL. After establishing and understanding both the

primary concepts, the book addresses them together by explaining Convolutional Neural Networks(CNNs). CNNs are further elaborated using top industry standards and research to explain how they provide complicated Object Detection in images and videos, while also explaining their evaluation. Towards the end, the book explains how to develop a fully functional object detection model, including its deployment over APIs. By the end of this book, you are well-equipped with the role of deep learning in the field of computer vision along with a guided process to design deep learning solutions. WHAT YOU WILL LEARN ● Get to know the mechanism of deep learning and how neural networks operate. ● Learn to develop a highly accurate neural network model. ● Access to rich Python libraries to address computer vision challenges. ● Build deep learning models using PyTorch and learn how to deploy using the API. ● Learn to develop Object Detection and Face Recognition models along with their deployment. WHO THIS BOOK IS FOR This book is for the readers who aspire to gain a strong fundamental understanding of how to infuse deep learning into computer vision and image processing applications. Readers are expected to have intermediate Python skills. No previous knowledge of PyTorch and Computer Vision is required. TABLE OF CONTENTS 1. An Introduction to Deep

Learning 2. Supervised Learning 3. Gradient Descent 4. OpenCV with Python 5. Python Imaging Library and Pillow 6. Introduction to Convolutional Neural Networks 7. GoogLeNet, VGGNet, and ResNet 8. Understanding Object Detection 9. Popular Algorithms for Object Detection 10. Faster RCNN with PyTorch and YoloV4 with Darknet 11. Comparing Algorithms and API Deployment with Flask 12. Applications in Real World

Feature Extraction and Image Processing for Computer Vision MIT Press (MA)

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.

Advanced Applied Deep Learning Academic Press

Rapid development of computer hardware has enabled usage of automatic object recognition in an

increasing number of applications, ranging from industrial image processing to medical applications, as well as tasks triggered by the widespread use of the internet. Each area of application has its specific requirements, and consequently these cannot all be tackled appropriately by a single, general-purpose algorithm. This easy-to-read text/reference provides a comprehensive introduction to the field of object recognition (OR). The book presents an overview of the diverse applications for OR and highlights important algorithm classes, presenting representative example algorithms for each class. The presentation of each algorithm describes the basic algorithm flow in detail, complete with graphical illustrations. Pseudocode implementations are also included for many of the methods, and definitions are supplied for terms which may be unfamiliar to the novice reader. Supporting a clear and intuitive tutorial style, the usage of mathematics is kept to a minimum. Topics and features: presents example algorithms covering global approaches, transformation-search-based methods, geometrical model driven methods, 3D object recognition schemes, flexible contour fitting algorithms, and descriptor-based methods; explores each method in its entirety, rather than focusing on individual steps in isolation, with a detailed

description of the flow of each algorithm, including graphical illustrations; explains the important concepts at length in a simple-to-understand style, with a minimum usage of mathematics; discusses a broad spectrum of applications, including some examples from commercial products; contains appendices discussing topics related to OR and widely used in the algorithms, (but not at the core of the methods described in the chapters). Practitioners of industrial image processing will find this simple introduction and overview to OR a valuable reference, as will graduate students in computer vision courses. Marco Treiber is a software developer at Siemens Electronics Assembly Systems, Munich, Germany, where he is Technical Lead in Image Processing for the Vision System of SiPlace placement machines, used in SMT assembly.