

Ahmed Elgammal

# Background Subtraction

Theory and Practice

# Background Subtraction Theory And Practice Synthesis Lectures On Computer Vision

**Khosrow-Pour, D.B.A., Mehdi**



## **Background Subtraction Theory And Practice Synthesis Lectures On Computer Vision:**

**Background Subtraction** Ahmed Elgammal, 2014-12-01 Background subtraction is a widely used concept for detection of moving objects in videos In the last two decades there has been a lot of development in designing algorithms for background subtraction as well as wide use of these algorithms in various important applications such as visual surveillance sports video analysis motion capture etc Various statistical approaches have been proposed to model scene backgrounds The concept of background subtraction also has been extended to detect objects from videos captured from moving cameras This book reviews the concept and practice of background subtraction We discuss several traditional statistical background subtraction models including the widely used parametric Gaussian mixture models and non parametric models We also discuss the issue of shadow suppression which is essential for human motion analysis applications This book discusses approaches and tradeoffs for background maintenance This book also reviews many of the recent developments in background subtraction paradigm Recent advances in developing algorithms for background subtraction from moving cameras are described including motion compensation based approaches and motion segmentation based approaches

**Background Subtraction** Ahmed Elgammal, 2022-05-31 Background subtraction is a widely used concept for detection of moving objects in videos In the last two decades there has been a lot of development in designing algorithms for background subtraction as well as wide use of these algorithms in various important applications such as visual surveillance sports video analysis motion capture etc Various statistical approaches have been proposed to model scene backgrounds The concept of background subtraction also has been extended to detect objects from videos captured from moving cameras This book reviews the concept and practice of background subtraction We discuss several traditional statistical background subtraction models including the widely used parametric Gaussian mixture models and non parametric models We also discuss the issue of shadow suppression which is essential for human motion analysis applications This book discusses approaches and tradeoffs for background maintenance This book also reviews many of the recent developments in background subtraction paradigm Recent advances in developing algorithms for background subtraction from moving cameras are described including motion compensation based approaches and motion segmentation based approaches For links to the videos to accompany this book please see [sites google com](https://www.google.com) [a morganclaypool com](https://www.morganclaypool.com) backgroundsubtraction Table of Contents Preface Acknowledgments Figure Credits Object Detection and Segmentation in Videos Background Subtraction from a Stationary Camera Background Subtraction from a Moving Camera Bibliography Author s Biography **Advanced**

## **Methodologies and Technologies in Artificial Intelligence, Computer Simulation, and Human-Computer**

**Interaction** Khosrow-Pour, D.B.A., Mehdi, 2018-09-28 As modern technologies continue to develop and evolve the ability of users to adapt with new systems becomes a paramount concern Research into new ways for humans to make use of advanced computers and other such technologies through artificial intelligence and computer simulation is necessary to fully realize

the potential of tools in the 21st century Advanced Methodologies and Technologies in Artificial Intelligence Computer Simulation and Human Computer Interaction provides emerging research in advanced trends in robotics AI simulation and human computer interaction Readers will learn about the positive applications of artificial intelligence and human computer interaction in various disciplines such as business and medicine This book is a valuable resource for IT professionals researchers computer scientists and researchers invested in assistive technologies artificial intelligence robotics and computer simulation

Encyclopedia of Information Science and Technology, Fourth Edition Khosrow-Pour, D.B.A., Mehdi, 2017-06-20 In recent years our world has experienced a profound shift and progression in available computing and knowledge sharing innovations These emerging advancements have developed at a rapid pace disseminating into and affecting numerous aspects of contemporary society This has created a pivotal need for an innovative compendium encompassing the latest trends concepts and issues surrounding this relevant discipline area During the past 15 years the Encyclopedia of Information Science and Technology has become recognized as one of the landmark sources of the latest knowledge and discoveries in this discipline The Encyclopedia of Information Science and Technology Fourth Edition is a 10 volume set which includes 705 original and previously unpublished research articles covering a full range of perspectives applications and techniques contributed by thousands of experts and researchers from around the globe This authoritative encyclopedia is an all encompassing well established reference source that is ideally designed to disseminate the most forward thinking and diverse research findings With critical perspectives on the impact of information science management and new technologies in modern settings including but not limited to computer science education healthcare government engineering business and natural and physical sciences it is a pivotal and relevant source of knowledge that will benefit every professional within the field of information science and technology and is an invaluable addition to every academic and corporate library

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uncertainty quantification and error propagation for computer vision image processing and image analysis that are based on partial differential equations PDEs It presents a concept with which error propagation and sensitivity analysis can be formulated with a set of basic operations The approach discussed in this book has the potential for application in all areas of quantitative computer vision image processing and image analysis In particular it might help medical imaging finally become a scientific discipline that is characterized by the classical paradigms of observation measurement and error awareness This book is comprised of eight chapters After an introduction to the goals of the book Chapter 1 we present a brief review of PDEs and their numerical treatment Chapter 2 PDE based image processing Chapter 3 and the numerics of stochastic PDEs Chapter 4 We then proceed to define the concept of stochastic images Chapter 5 describe how to accomplish image processing and computer vision with stochastic images Chapter 6 and demonstrate the use of these principles for accomplishing sensitivity analysis Chapter 7 Chapter 8 concludes the book and highlights new research topics for the future

Robust Background Subtraction with Foreground Validation for Urban Traffic Video ,2004 Identifying moving objects in a video sequence is a fundamental and critical task in many computer vision applications Background subtraction techniques are commonly used to separate foreground moving objects from the background Most background subtraction techniques assume a single rate of adaptation which is inadequate for complex scenes such as a traffic intersection where objects are moving at different and varying speeds In this paper we propose a foreground validation algorithm that first builds a foreground mask using a slow adapting Kalman filter and then validates individual foreground pixels by a simple moving object model built using both the foreground and background statistics as well as the frame difference Ground truth experiments with urban traffic sequences show that our proposed algorithm significantly improves upon results using only Kalman filter or frame differencing and outperforms other techniques based on mixture of Gaussians median filter and approximated media filter

**View Synthesis Using Stereo Vision** Daniel Scharstein,1999-06-09 Image based rendering as an area of overlap between computer graphics and computer vision uses computer vision techniques to aid in synthesizing new views of scenes Image based rendering methods are having a substantial impact on the field of computer graphics and also play an important role in the related field of multimedia systems for applications such as teleconferencing remote instruction and surgery virtual reality and entertainment The book develops a novel way of formalizing the view synthesis problem under the full perspective model yielding a clean linear warping equation It shows new techniques for dealing with visibility issues such as partial occlusion and holes Furthermore the author thoroughly re evaluates the requirements that view synthesis places on stereo algorithms and introduces two novel stereo algorithms specifically tailored to the application of view synthesis

**Transformational Models for Background Subtraction with Moving Cameras** Daniya Zamalieva,OhioLINK Electronic Theses and Dissertations Center,2014 Background subtraction is a commonly used technique in computer vision for detecting objects While there is an extensive literature regarding background subtraction most of the

existing methods assume that the camera is stationary This assumption limits their applicability for moving camera scenarios To overcome this limitation we approach the background subtraction problem from a geometric perspective and introduce multiple background transformation models that utilize various geometric relations Unlike previous methods the proposed algorithms do not rely on certain camera motions or assumptions about the scene geometry First we introduce a 2.5D background model that describes the scene in terms of both its appearance and geometry In this model the 3D scene is represented as a stack of parallel hypothetical planes so that each plane is associated with a homography transform A pixel that belongs to a background scene structure consistently maps between the consecutive frames based on the corresponding plane projective transformation with respect to the hypothetical plane it lies on This consistency in mapping is not expected for a moving object since its motion does not comply with the camera motion This observation disambiguates moving objects from the background

**Background Subtraction by Disparity Warping** John Hau-Han Liu,1998      **Video Processing and Background Subtraction for Change Detection and Activity Recognition** Konstantinos Avgerinakis,2015

Shape Reconstruction from Apparent Contours Giovanni Bellettini,Valentina Beorchia,Maurizio Paolini,Franco Pasquarelli,2016-10-09 Motivated by a variational model concerning the depth of the objects in a picture and the problem of hidden and illusory contours this book investigates one of the central problems of computer vision the topological and algorithmic reconstruction of a smooth three dimensional scene starting from the visible part of an apparent contour The authors focus their attention on the manipulation of apparent contours using a finite set of elementary moves which correspond to diffeomorphic deformations of three dimensional scenes A large part of the book is devoted to the algorithmic part with implementations experiments and computed examples The book is intended also as a user's guide to the software code appcontour written for the manipulation of apparent contours and their invariants This book is addressed to theoretical and applied scientists working in the field of mathematical models of image segmentation      *Robust Background Subtraction for Moving Cameras and Their Applications in Ego-vision Systems* Hasan Sajid,2016

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