Filter Based Mean Field Inference For Random Fields With

This volume constitutes the refereed proceedings of the 11th International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition, EMMCVPR 2017, held in Venice, Italy, in October/November 2017. The 37 revised full papers were carefully reviewed and selected from 51 submissions. The papers are organized in topical sections on Clustering and Quantum Methods; Motion and Tracking; Image Processing and Segmentation; Color, Shading and Reflectance of Light; Propagation and Time-evolution; and Inference, Labeling, and Relaxation.

This book presents the proceedings of International Conference on Knowledge Society: Technology, Sustainability and Educational Innovation (TSIE 2019). The conference, which was held at UTN in Ibarra, Ecuador, on 3–5 July 2019, allowed participants and speakers to share their research and findings on emerging and innovative global issues. The conference was organized in collaboration with a number of research groups: Group for the Scientific Research Network (e-CIER); Research Group in Educational Innovation and Technology, University of Salamanca, Spain(GITE-USAL); International Research Group for Heritage and Sustainability (GIIPS), and the Social Science Research Group (GICS). In addition, it had the endorsement of the RedCLARA, e-science, Fidal Foundation, Red CEDIA, IEEE, Microsoft, Business IT, Adobe, and Argo Systems. The term "knowledge society" can be understood as the management, understanding and co-creation of knowledge oriented toward the sustainable development and positive transformation of society. In this context and on the occasion of the XXXIII anniversary of the Universidad Técnica del Norte (UTN), the Postgraduate Institute through its Master of Technology and Educational Innovation held the I International Congress on Knowledge Society: Technology, Sustainability and Educational Innovation – TSIE 2019, which brought together educators, researchers, academics, students, managers, and professionals, from both the public and private sectors to share knowledge and technological developments. The book covers the following topics: 1. curriculum, technology and educational innovation; 2. media and education; 3. applied computing; 4. educational robotics. 5. technology, culture, heritage, and tourism development perspectives; and 6. biodiversity and sustainability.

Statistical learning and analysis techniques have become extremely important today, given the tremendous growth in the size of heterogeneous data collections and the ability to process it even from physically distant locations. Recent advances made in the field of machine learning provide a strong framework for robust learning from the diverse corpora and continue to impact a variety of research problems across multiple scientific disciplines. The aim of this handbook is to familiarize beginners as well as experts with some of the recent techniques in this field. The Handbook is divided in two sections: Theory and Applications,

covering machine learning, data analytics, biometrics, document recognition and security. very relevant to current research challenges faced in various fields self-contained reference to machine learning emphasis on applications-oriented techniques

This book constitutes the proceedings of the First International Workshop on Advances in Simplifying Medical UltraSound, ASMUS 2020, and the 5th International Workshop on Perinatal, Preterm and Paediatric Image Analysis, PIPPI 2020, held in conjunction with MICCAI 2020, the 23rd International Conference on Medical Image Computing and Computer-Assisted Intervention. The conference was planned to take place in Lima, Peru, but changed to an online event due to the Coronavirus pandemic. For ASMUS 2020, 19 contributions were accepted from 26 submissions; the 14 contributions from the PIPPI workshop were carefully reviewed and selected from 21 submissions. The papers were organized in topical sections named: diagnosis and measurement; segmentation, captioning and enhancement; localisation and guidance; robotics and skill assessment, and PIPPI 2020.

The 4 volume set LNCS 12112-12114 constitutes the papers of the 25th International Conference on Database Systems for Advanced Applications which will be held online in September 2020. The 119 full papers presented together with 19 short papers plus 15 demo papers and 4 industrial papers in this volume were carefully reviewed and selected from a total of 487 submissions. The conference program presents the state-of-the-art R&D activities in database systems and their applications. It provides a forum for technical presentations and discussions among database researchers, developers and users from academia, business and industry.

The core of this paper is a general set of variational principles for the problems of computing marginal probabilities and modes, applicable to multivariate statistical models in the exponential family.

This book constitutes the refereed proceedings of the 13th International Conference on Advanced Concepts for Intelligent Vision Systems, ACIVS 2011, held in Ghent, Belgium, in August 2011. The 66 revised full papers presented were carefully reviewed and selected from 124 submissions. The papers are organized in topical sections on classification recognition, and tracking, segmentation, images analysis, image processing, video surveillance and biometrics, algorithms and optimization; and 3D, depth and scene understanding.

The six-volume set comprising the LNCS volumes 11129-11134 constitutes the refereed proceedings of the workshops that took place in conjunction with the 15th European Conference on Computer Vision, ECCV 2018, held in Munich, Germany, in September 2018.43 workshops from 74 workshops proposals were selected for inclusion in the proceedings. The workshop topics present a good orchestration of new trends and traditional issues, built bridges into neighboring fields, and discuss fundamental technologies and novel applications.

The annual conference on NIPS is the flagship conference on neural computation. It

draws top academic researchers from around the world & is considered to be a showcase conference for new developments in network algorithms & architectures. This volume contains all of the papers presented at NIPS 2006.

Big Data in Omics and Imaging: Integrated Analysis and Causal Inference addresses the recent development of integrated genomic, epigenomic and imaging data analysis and causal inference in big data era. Despite significant progress in dissecting the genetic architecture of complex diseases by genome-wide association studies (GWAS), genome-wide expression studies (GWES), and epigenome-wide association studies (EWAS), the overall contribution of the new identified genetic variants is small and a large fraction of genetic variants is still hidden. Understanding the etiology and causal chain of mechanism underlying complex diseases remains elusive. It is time to bring big data, machine learning and causal revolution to developing a new generation of genetic analysis for shifting the current paradigm of genetic analysis from shallow association analysis to deep causal inference and from genetic analysis alone to integrated omics and imaging data analysis for unraveling the mechanism of complex diseases. FEATURES Provides a natural extension and companion volume to Big Data in Omic and Imaging: Association Analysis, but can be read independently. Introduce causal inference theory to genomic, epigenomic and imaging data analysis Develop novel statistics for genome-wide causation studies and epigenome-wide causation studies. Bridge the gap between the traditional association analysis and modern causation analysis Use combinatorial optimization methods and various causal models as a general framework for inferring multilevel omic and image causal networks Present statistical methods and computational algorithms for searching causal paths from genetic variant to disease Develop causal machine learning methods integrating causal inference and machine learning Develop statistics for testing significant difference in directed edge, path, and graphs, and for assessing causal relationships between two networks The book is designed for graduate students and researchers in genomics, epigenomics, medical image, bioinformatics, and data science. Topics covered are: mathematical formulation of causal inference, information geometry for causal inference, topology group and Haar measure, additive noise models, distance correlation, multivariate causal inference and causal networks, dynamic causal networks, multivariate and functional structural equation models, mixed structural equation models, causal inference with confounders, integer programming, deep learning and differential equations for wearable computing, genetic analysis of function-valued traits, RNA-seq data analysis, causal networks for genetic methylation analysis, gene expression and methylation deconvolution, cell –specific causal networks, deep learning for image segmentation and image analysis, imaging and genomic data analysis, integrated multilevel causal genomic, epigenomic and imaging data analysis. A comprehensive introduction to machine learning that uses probabilistic models and inference as a unifying approach. Today's Web-enabled deluge of electronic data calls for automated methods of data analysis. Machine learning provides these, developing methods that can automatically detect patterns in data and then use the uncovered patterns to predict future data. This textbook offers a comprehensive and self-contained introduction to the field of machine learning, based on a unified, probabilistic approach. The coverage combines breadth and depth, offering necessary background material on such topics as probability, optimization, and linear algebra as well as discussion of

recent developments in the field, including conditional random fields, L1 regularization, and deep learning. The book is written in an informal, accessible style, complete with pseudo-code for the most important algorithms. All topics are copiously illustrated with color images and worked examples drawn from such application domains as biology, text processing, computer vision, and robotics. Rather than providing a cookbook of different heuristic methods, the book stresses a principled model-based approach, often using the language of graphical models to specify models in a concise and intuitive way. Almost all the models described have been implemented in a MATLAB software package—PMTK (probabilistic modeling toolkit)—that is freely available online. The book is suitable for upper-level undergraduates with an introductory-level college math background and beginning graduate students.

This book presents a comprehensive and up-to-date treatise of a range of methodological and algorithmic issues. It also discusses implementations and case studies, identifies the best design practices, and assesses data analytics business models and practices in industry, health care, administration and business.Data science and big data go hand in hand and constitute a rapidly growing area of research and have attracted the attention of industry and business alike. The area itself has opened up promising new directions of fundamental and applied research and has led to interesting applications, especially those addressing the immediate need to deal with large repositories of data and building tangible, user-centric models of relationships in data. Data is the lifeblood of today's knowledge-driven economy.Numerous data science models are oriented towards end users and along with the regular requirements for accuracy (which are present in any modeling), come the requirements for ability to process huge and varying data sets as well as robustness, interpretability, and simplicity (transparency). Computational intelligence with its underlying methodologies and tools helps address data analytics needs.The book is of interest to those researchers and practitioners involved in data science, Internet engineering, computational intelligence, management, operations research, and knowledge-based systems.

The 30-volume set, comprising the LNCS books 12346 until 12375, constitutes the refereed proceedings of the 16th European Conference on Computer Vision, ECCV 2020, which was planned to be held in Glasgow, UK, during August 23-28, 2020. The conference was held virtually due to the COVID-19 pandemic. The 1360 revised papers presented in these proceedings were carefully reviewed and selected from a total of 5025 submissions. The papers deal with topics such as computer vision; machine learning; deep neural networks; reinforcement learning; object recognition; image classification; image processing; object detection; semantic segmentation; human pose estimation; 3d reconstruction; stereo vision; computational photography; neural networks; image coding; image reconstruction; object recognition; motion estimation.

Probabilistic Reasoning and Decision Making in Sensory-Motor Systems by Pierre Bessiere, Christian Laugier and Roland Siegwart provides a unique collection of a sizable segment of the cognitive systems research community in Europe. It reports on contributions from leading academic institutions brought together within the European projects Bayesian Inspired Brain and Artifact (BIBA) and Bayesian Approach to Cognitive Systems (BACS). This fourteen-chapter volume covers important research along two main lines: new probabilistic models and algorithms for perception and

action, new probabilistic methodology and techniques for artefact conception and development. The work addresses key issues concerned with Bayesian programming, navigation, filtering, modelling and mapping, with applications in a number of different contexts.

This book systematically synthesizes research achievements in the field of fuzzy neural networks in recent years. It also provides a comprehensive presentation of the developments in fuzzy neural networks, with regard to theory as well as their application to system modeling and image restoration. Special emphasis is placed on the fundamental concepts and architecture analysis of fuzzy neural networks. The book is unique in treating all kinds of fuzzy neural networks and their learning algorithms and universal approximations, and employing simulation examples which are carefully designed to help the reader grasp the underlying theory. This is a valuable reference for scientists and engineers working in mathematics, computer science, control or other fields related to information processing. It can also be used as a textbook for graduate courses in applied mathematics, computer science, automatic control and electrical engineering.

Exciting new developments and applications of imaging techniques have emerged over the last few years, leading to many improvements in diagnosis and staging of urologic diseases. Refinements in the technology mean that imaging now is much more precise than even five years ago, and this has significantly enhanced its application within several key fields. As such, there are virtually no books currently available that cover the impact of these advances within urology leaving a major hole in the market. With its sound overview of the current state of affairs, and also its focus on highlighting future advances, this book would therefore find a significant audience within not only trainees, but also practicing clinicians too. Furthermore, the whole topic of ultrasonography is a relatively overlooked one, with very few modern books tackling any specific areas of the field. This book will be up-to-date and will pay attention to the unique applications of ultrasound within each discipline.

Mathematics of Autonomy provides solid mathematical foundations for building useful Autonomous Systems. It clarifies what makes a system autonomous rather than simply automated, and reveals the inherent limitations of systems currently incorrectly labeled as autonomous in reference to the specific and strong uncertainty that characterizes the environments they operate in. Such complex real-world environments demand truly autonomous solutions to provide the flexibility and robustness needed to operate well within them. This volume embraces hybrid solutions to demonstrate extending the classes of uncertainty autonomous systems can handle. In particular, it combines physical-autonomy (robots), cyber-autonomy (agents) and cognitive-autonomy (cyber and embodied cognition) to produce a rigorous subset of trusted autonomy: Cyber-Physical-Cognitive autonomy (CPC-autonomy). The body of the book alternates between underlying theory and applications of CPC-autonomy including "Autonomous Supervision of a Swarm of Robots," "Using Wind Turbulence against a Swarm of UAVs" and "Unique Super-Dynamics for All Kinds of Robots (UAVs, UGVs, UUVs and USVs)" to illustrate how to effectively construct Autonomous Systems using this model. It avoids the wishful thinking that characterizes much discussion related to autonomy, discussing the hard limits and challenges of real autonomous systems. In so doing, it clarifies where more work is needed, and also provides a rigorous set of tools to tackle some of the problem space. Contents: Introduction Physics of the CPC-Autonomy: Port-Hamiltonian Dynamics and Control of Multi-Physical Networks CPC-Application: Autonomous Brain-Like Supervisor for a Swarm of Robots Micro-Cognitive CPC-Autonomy: Quantum

Computational Tensor Networks Cyber-Cognitive CPC-Autonomy: TensorFlow and Deep Neural Tensor Networks Cognitive Control in CPC-Autonomy: Perceptual Control Theory and Its Alternatives CPC-Application: Using Wind Turbulence against a Team of UAVs Cognitive Estimation in CPC-Autonomy: Recursive Bayesian Filters and FastSLAM Algorithms CPC Super-Dynamics for a Universal Large-Scale Autonomous Operation Appendix 1: The World of Tensors Appendix 2: Classical Neural Networks and AI Readership: Undergraduates, graduates and researchers in computer science, pure and applied mathematics, engineering, and physics. Keywords: Autonomous Systems;Trusted Autonomy;Cyber-Physical Systems;Cognitive Systems;Port-Hamiltonian Dynamics and Control;Swarm of Robots;Brain-Like Supervisor;Deep Learning;Perceptual Control Theory;Wind Turbulence;Bayesian Estimation;FastSLAM Algorithms;Super-Dynamics;Tensors;Neural Networks;AIReview: Key Features: A critical examination of the unique challenges of Trusted Autonomous Systems Demonstrates the combination of many diverse approaches including Fuzzy Logic, Port-Hamiltonian Control Structures, Entangled-Quantum Computations, Deep Learning and Recursive Bayesian Filters and FastSLAM Algorithms Rigorous Mathematical Foundations including background tutorials Includes several solved examples

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The seven-volume set comprising LNCS volumes 8689-8695 constitutes the refereed proceedings of the 13th European Conference on Computer Vision, ECCV 2014, held in Zurich, Switzerland, in September 2014. The 363 revised papers presented were carefully reviewed and selected from 1444 submissions. The papers are organized in topical sections on tracking and activity recognition; recognition; learning and inference; structure from motion and feature matching; computational photography and low-level vision; vision; segmentation and saliency; context and 3D scenes; motion and 3D scene analysis; and poster sessions.

NUMGE 2018 is the ninth in a series of conferences on Numerical Methods in Geotechnical Engineering organized by the ERTC7 under the auspices of the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). The first conference was held in 1986 in Stuttgart, Germany and the series continued every four years (1990 Santander, Spain; 1994 Manchester, United Kingdom; 1998 Udine, Italy; 2002 Paris, France; 2006 Graz, Austria; 2010 Trondheim, Norway; 2014 Delft, The Netherlands). The conference provides a forum for exchange of ideas and discussion on topics related to numerical modelling in geotechnical engineering. Both senior and young researchers, as well as scientists and engineers from Europe and overseas, are invited to attend this conference to share and exchange their knowledge and experiences.

This book provides a comprehensive analysis of Brooks-Iyengar Distributed Sensing Algorithm, which brings together the power of Byzantine Agreement and sensor fusion in building a fault-tolerant distributed sensor network. The authors analyze its long-term impacts, advances, and future prospects. The book starts by discussing the Brooks-Iyengar algorithm, which has made significant impact since its initial publication in 1996. The authors show how the technique has been applied in many domains such as software reliability, distributed systems and OS development, etc. The book exemplifies how the algorithm has enhanced new real-time features by adding fault-tolerant capabilities for many applications. The authors posit that the Brooks-Iyengar Algorithm will to continue to be used where fault-tolerant solutions are needed in redundancy system scenarios. This book celebrates S.S. Iyengar's accomplishments that led to his 2019 Institute of Electrical and Electronics Engineers' (IEEE) Cybermatics Congress "Test of Time Award" for his work on creating Brooks-Iyengar Algorithm and its impact in advancing modern computing.

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Mechanics and Geotechnical Engineering (ISSMGE). The first conference was held in 1986 in Stuttgart, Germany and the series continued every four years (1990 Santander, Spain; 1994 Manchester, United Kingdom; 1998 Udine, Italy; 2002 Paris, France; 2006 Graz, Austria; 2010 Trondheim, Norway; 2014 Delft, The Netherlands). The conference provides a forum for exchange of ideas and discussion on topics related to numerical modelling in geotechnical engineering. Both senior and young researchers, as well as scientists and engineers from Europe and overseas, are invited to attend this conference to share and exchange their knowledge and experiences. This work is the first volume of NUMGE 2018.

This volume constitutes the refereed proceedings of the 9th International Conference on Energy Minimization Methods in Computer Vision and Pattern Recognition, EMMCVPR 2013, held in Lund, Sweden, in August 2013. The 26 revised full papers were carefully reviewed and selected from 40 submissions. The papers are organized in topical sections on Medical Imaging; Image Editing; 3D Reconstruction; Shape Matching; Scene Understanding; Segmentation; Superpixels; Statistical Methods and Learning.

This volume constitutes the refereed proceedings of the 5th Iberian Conference on Pattern Recognition and Image Analysis, IbPRIA 2011, held in Las Palmas de Gran Canaria, Spain, in June 2011. The 34 revised full papers and 58 revised poster papers presented were carefully reviewed and selected from 158 submissions. The papers are organized in topical sections on computer vision; image processing and analysis; medical applications; and pattern recognition.

Probabilistic Graphical Models for Computer Vision introduces probabilistic graphical models (PGMs) for computer vision problems and teaches how to develop the PGM model from training data. This book discusses PGMs and their significance in the context of solving computer vision problems, giving the basic concepts, definitions and properties. It also provides a comprehensive introduction to well-established theories for different types of PGMs, including both directed and undirected PGMs, such as Bayesian Networks, Markov Networks and their variants. Discusses PGM theories and techniques with computer vision examples Focuses on well-established PGM theories that are accompanied by corresponding pseudocode for computer vision Includes an extensive list of references, online resources and a list of publicly available and commercial software Covers computer vision tasks, including feature extraction and image segmentation, object and facial recognition, human activity recognition, object tracking and 3D reconstruction

The proceedings of the 2000 Neural Information Processing Systems (NIPS) Conference.The annual conference on Neural Information Processing Systems (NIPS) is the flagship conference on neural computation. The conference is interdisciplinary, with contributions in algorithms, learning theory, cognitive science, neuroscience, vision, speech and signal processing, reinforcement learning and control, implementations, and diverse applications. Only about 30 percent of the papers submitted are accepted for presentation at NIPS, so the quality is exceptionally high. These proceedings contain all of the papers that were presented at the 2000 conference.

Data assimilation (DA) has been recognized as one of the core techniques for modern forecasting in various earth science disciplines including meteorology, oceanography, and hydrology. Since early 1990s DA has been an important s-

sion topic in many academic meetings organized by leading societies such as the American Meteorological Society, American Geophysical Union, European G-physical Union, World Meteorological Organization, etc. nd Recently, the 2 Annual Meeting of the Asia Oceania Geosciences Society (AOGS), held in Singapore in June 2005, conducted a session on DA under the - tle of "Data Assimilation for Atmospheric, Oceanic and Hydrologic Applications." nd This rst DA session in the 2 AOGS was a great success with more than 30 papers presented and many great ideas exchanged among scientists from the three different disciplines. The scientists who participated in the meeting suggested making the DA session a biennial event. th Two years later, at the 4 AOGS Annual Meeting, Bangkok, Thailand, the DA session was of cially named "Sasaki Symposium on Data Assimilation for At- spheric, Oceanic and Hydrologic Applications," to honor Prof. Yoshi K. Sasaki of the University of Oklahoma for his life-long contributions to DA in geosciences.

This book constitutes the refereed proceedings of the 34th Symposium of the German Association for Pattern Recognition, DAGM 2012, and the 36th Symposium of the Austrian Association for Pattern Recognition, OAGM 2012, held in Graz, Austria, in August 2012. The 27 revised full papers and 23 revised poster papers were carefully reviewed and selected from 98 submissions. The papers are organized in topical sections on segmentation, low-level vision, 3D reconstruction, recognition, applications, learning, and features.

Based on years of instruction and field expertise, this volume offers the necessary tools to understand all scientific, computational, and technological aspects of speech processing. The book emphasizes mathematical abstraction, the dynamics of the speech process, and the engineering optimization practices that promote effective problem solving in this area of research and covers many years of the authors' personal research on speech processing. Speech Processing helps build valuable analytical skills to help meet future challenges in scientific and technological advances in the field and considers the complex transition from human speech processing to computer speech processing.

The six-volume set LNCS 11764, 11765, 11766, 11767, 11768, and 11769 constitutes the refereed proceedings of the 22nd International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2019, held in Shenzhen, China, in October 2019. The 539 revised full papers presented were carefully reviewed and selected from 1730 submissions in a double-blind review process. The papers are organized in the following topical sections: Part I: optical imaging; endoscopy; microscopy. Part II: image segmentation; image registration; cardiovascular imaging; growth, development, atrophy and progression. Part III: neuroimage reconstruction and synthesis; neuroimage segmentation; diffusion weighted magnetic resonance imaging; functional neuroimaging (fMRI); miscellaneous neuroimaging. Part IV: shape; prediction; detection and localization; machine learning; computer-aided diagnosis; image reconstruction and synthesis. Part V: computer assisted interventions; MIC meets

CAI. Part VI: computed tomography; X-ray imaging.

The seven-volume set comprising LNCS volumes 7572-7578 constitutes the refereed proceedings of the 12th European Conference on Computer Vision, ECCV 2012, held in Florence, Italy, in October 2012. The 408 revised papers presented were carefully reviewed and selected from 1437 submissions. The papers are organized in topical sections on geometry, 2D and 3D shapes, 3D reconstruction, visual recognition and classification, visual features and image matching, visual monitoring: action and activities, models, optimisation, learning, visual tracking and image registration, photometry: lighting and colour, and image segmentation.

The International Conference on Intelligent Computing (ICIC) was set up as an annual forum dedicated to emerging and challenging topics in the various aspects of advances in computational intelligence fields, such as artificial intelligence, machine learning, bioinformatics, and computational biology, etc. The goal of this conference was to bring together researchers from academia and industry as well as practitioners to share ideas, problems and solutions related to the multifaceted aspects of intelligent computing. This book constitutes the proceedings of the International Conference on Intelligent Computing (ICIC 2005), held in Hefei, Anhui, China, during August 23–26, 2005. ICIC 2005 received over 2000 submissions from authors in 39 countries and regions. Based on rigorous peer reviews, the Program Committee selected 563 high-quality papers for presentation at ICIC 2005; of these, 215 papers were published in this book organized into 9 categories, and the other 348 papers were published in five international journals. The organizers of ICIC 2005 made great efforts to ensure the success of this conference. We here thank the members of the ICIC 2005 Advisory Committee for their guidance and advice, the members of the Program Committee and the referees for reviewing the papers, and the members of the Publication Committee for checking and compiling the papers. We would also like to thank the publisher, Springer, for their support in publishing the proceedings in the Lecture Notes in Computer Science series. Particularly, we would like to thank all the authors for contributing their papers.

The eight-volume set comprising LNCS volumes 9905-9912 constitutes the refereed proceedings of the 14th European Conference on Computer Vision, ECCV 2016, held in Amsterdam, The Netherlands, in October 2016. The 415 revised papers presented were carefully reviewed and selected from 1480 submissions. The papers cover all aspects of computer vision and pattern recognition such as 3D computer vision; computational photography, sensing and display; face and gesture; low-level vision and image processing; motion and tracking; optimization methods; physics-based vision, photometry and shape-from-X; recognition: detection, categorization, indexing, matching; segmentation, grouping and shape representation; statistical methods and learning; video: events, activities and surveillance; applications. They are organized in topical sections on detection, recognition and retrieval; scene understanding; optimization; image and video processing; learning; action activity and tracking; 3D; and 9 poster sessions.

This book tries to address the following questions: How should the uncertainty and incompleteness inherent to sensing the environment be represented and modelled in a way that will increase the autonomy of a robot? How should a robotic system perceive, infer, decide and act efficiently? These are two of the challenging questions robotics community and robotic researchers have been facing. The development of robotic domain by the 1980s spurred the convergence of automation to autonomy, and the field of robotics has consequently converged towards the field of artificial intelligence (AI). Since the end of that decade, the general public's imagination has been stimulated by high expectations on autonomy, where AI and robotics try to solve difficult cognitive problems through algorithms developed from either philosophical and anthropological conjectures or incomplete notions of cognitive reasoning. Many of these developments do not unveil even a few of the processes through which biological organisms solve these same problems with little energy and computing resources. The tangible results of this research tendency were many robotic devices demonstrating good performance, but only under well-defined and constrained environments. The adaptability to different and more complex scenarios was very limited. In this book, the application of Bayesian models and approaches are described in order to develop artificial cognitive systems that carry out complex tasks in real world environments, spurring the design of autonomous, intelligent and adaptive artificial systems, inherently dealing with uncertainty and the "irreducible incompleteness of models".

The three-volume set LNCS 8149, 8150, and 8151 constitutes the refereed proceedings of the 16th International Conference on Medical Image Computing and Computer-Assisted Intervention, MICCAI 2013, held in Nagoya, Japan, in September 2013. Based on rigorous peer reviews, the program committee carefully selected 262 revised papers from 789 submissions for presentation in three volumes. The 95 papers included in the first volume have been organized in the following topical sections: physiological modeling and computer-assisted intervention; imaging, reconstruction, and enhancement; registration; machine learning, statistical modeling, and atlases; computer-aided diagnosis and imaging biomarkers; intraoperative guidance and robotics; microscope, optical imaging, and histology; cardiology, vasculatures and tubular structures; brain imaging and basic techniques; diffusion MRI; and brain segmentation and atlases.

This book presents a detailed review of the state of the art in deep learning approaches for semantic object detection and segmentation in medical image computing, and large-scale radiology database mining. A particular focus is placed on the application of convolutional neural networks, with the theory supported by practical examples. Features: highlights how the use of deep neural networks can address new questions and protocols, as well as improve upon existing challenges in medical image computing; discusses the insightful research experience of Dr. Ronald M. Summers; presents a comprehensive review of the latest research and literature; describes a range of different methods that make use of deep learning for object or landmark detection tasks in 2D and 3D medical imaging; examines a varied selection of techniques for semantic segmentation using deep learning principles in medical imaging; introduces a novel approach to interleaved text and image deep mining on a large-scale radiology image database.

The sixteen-volume set comprising the LNCS volumes 11205-11220 constitutes the

refereed proceedings of the 15th European Conference on Computer Vision, ECCV 2018, held in Munich, Germany, in September 2018.The 776 revised papers presented were carefully reviewed and selected from 2439 submissions. The papers are organized in topical sections on learning for vision; computational photography; human analysis; human sensing; stereo and reconstruction; optimization; matching and recognition; video attention; and poster sessions.

In the last three decades, there has been a dramatic increase in the use of interacting particle methods as a powerful tool in real-world applications of Monte Carlo simulation in computational physics, population biology, computer sciences, and statistical machine learning. Ideally suited to parallel and distributed computation, these advanced particle algorithms include nonlinear interacting jump diffusions; quantum, diffusion, and resampled Monte Carlo methods; Feynman-Kac particle models; genetic and evolutionary algorithms; sequential Monte Carlo methods; adaptive and interacting Markov chain Monte Carlo models; bootstrapping methods; ensemble Kalman filters; and interacting particle filters. Mean Field Simulation for Monte Carlo Integration presents the first comprehensive and modern mathematical treatment of mean field particle simulation models and interdisciplinary research topics, including interacting jumps and McKean-Vlasov processes, sequential Monte Carlo methodologies, genetic particle algorithms, genealogical tree-based algorithms, and quantum and diffusion Monte Carlo methods. Along with covering refined convergence analysis on nonlinear Markov chain models, the author discusses applications related to parameter estimation in hidden Markov chain models, stochastic optimization, nonlinear filtering and multiple target tracking, stochastic optimization, calibration and uncertainty propagations in numerical codes, rare event simulation, financial mathematics, and free energy and quasi-invariant measures arising in computational physics and population biology. This book shows how mean field particle simulation has revolutionized the field of Monte Carlo integration and stochastic algorithms. It will help theoretical probability researchers, applied statisticians, biologists, statistical physicists, and computer scientists work better across their own disciplinary boundaries.

Control theory, an interdisciplinary concept dealing with the behaviour of dynamical systems, is an important but often overlooked aspect of physics. This is the first broad and complete treatment of the topic tailored for physicists, one which goes from the basics right through to the most recent advances. Simple examples develop a deep understanding and intuition for the systematic principles of control theory, beyond the recipes given in standard engineering-focused texts. Up-to-date coverage of control of networks and complex systems, and a thorough discussion of the fundamental limits of control, including the limitations placed by causality, information theory, and thermodynamics are included. In addition it explores important recent advances in stochastic thermodynamics on the thermodynamic costs of information processing and control. For all students of physics interested in control theory, this classroom-tested, comprehensive approach to the topic with online solutions and further materials delivers both fundamental principles and current developments.

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