Asymptotic Tracking By A Reinforcement Learning Based

Model-Based Reinforcement Learning
Advances in Nonlinear Systems and Networks
Advanced Control Methods in Marine Robotics Applications
Animal Learning & Behavior
Deep Reinforcement Learning with Guaranteed Performance
Wescon/95
The Engineering Index Annual
Reinforcement Learning for Optimal Feedback Control
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Psychology of Learning and Motivation
Handbook of Computational Economics
Output Feedback Reinforcement Learning Control for Linear Systems
Advances in Automation and Robotics Research
Sign-tracking

Railway Track and Structures
Reinforcement Learning, second edition
Human-Robot Interaction Control Using Reinforcement Learning
Synchronous Reinforcement Learning-Based Control for Cognitive Autonomy
Proceedings of 2021 Chinese Intelligent Systems Conference
Boundary Control of Flexible Three-Dimensional Euler–Bernoulli Beams
Dynamics and Control of Robotic Manipulators with Contact and Friction
Intelligent Control and Applications for Robotics
Neural Information Processing
Adaptive Dynamic Programming: Single and Multiple Controllers
Response Probability in a Two-choice Learning Situation with Varying Probability of Reinforcement
Integral and Inverse Reinforcement Learning for Optimal Control Systems and Games
Reinforcement Learning and Approximate Dynamic Programming for Feedback Control
Animal Behaviour Abstracts
Adaptive Dynamic Programming for Control
Scientific and Technical Aerospace Reports
Introduction to Theories of Learning
Model-Based Reinforcement Learning

Fiber-Reinforced Nanocomposites: Fundamentals and Applications
Advances in Guidance, Navigation and Control
International Aerospace Abstracts
Mathematics—Advances in Research and Application: 2012 Edition
Cooperative Control of Multi-Agent Systems with Uncertainties
Robust Adaptive Dynamic Programming
Mathematical Treatment of Nanomaterials and Neural Networks

BREANNA DICKSON

Model-Based Reinforcement Learning
John Wiley & Sons
Multi-agent coordination is an emerging engineering It has been inspired by the observations and descriptions of collective behavior in nature, such as fish schooling, birds flocking and insects swarming. The advantages of multi-agent coordination include: it can reduce cost and complexity from hardware platform to software and algorithms; in addition, multi-agent systems are capable of many tasks which could not be effectively performed by a single-robot system, for example, the surveillance task. The book proposes a hierarchical design framework that places uncertainties related to system models in the decentralized control

layer (bottom layer) and the ones related to the communication (as well as physical interaction) between the agents in the distributed decision-making layer (top layer). The book shows that the two layers meet the separation principle under certain conditions, so that through the two-layer design framework, any challenges can be resolved independently, and the design complexity will not increase with the level of uncertainties. In addition, in order to solve the problem of energy limitation of agents, this book also studies the event-driven cooperative control of multi-agent systems, which can effectively reduce the energy consumption of agents and increase their operational life span. Bridges the gap for engineers and technicians in the automation industry, including theory and practice Provides a general framework for dealing with various uncertainties in multi-agent cooperative control problems Contains contributions surrounding the development of multi-agent systems control theory

Advances in Nonlinear Systems and Networks

Psychology Press

Model-Based Reinforcement Learning Explore a comprehensive and practical approach to reinforcement learning Reinforcement learning is an essential paradigm of machine learning, wherein an intelligent agent performs actions that ensure optimal behavior from devices. While this paradigm of machine learning has gained

tremendous success and popularity in recent years, previous scholarship has focused either on theory—optimal control and dynamic programming – or on algorithms—most of which are simulation-based. Model-Based Reinforcement Learning provides a model-based framework to bridge these two aspects, thereby creating a holistic treatment of the topic of model-based online learning control. In doing so, the authors seek to develop a model-based framework for data-driven control that bridges the topics of systems identification from data, model-based reinforcement learning, and optimal control, as well as the applications of each. This new technique for assessing classical results will allow for a more efficient reinforcement learning system. At its heart, this book is focused on providing an end-to-end framework—from design to application—of a more tractable model-based reinforcement learning technique. Model-Based Reinforcement Learning readers will also find: A useful textbook to use in graduate courses on data-driven and learning-based control that emphasizes modeling and control of dynamical systems from data Detailed comparisons of the impact of different techniques, such as basic linear quadratic controller, learning-based model predictive control, model-free reinforcement learning, and structured online learning Applications and case

studies on ground vehicles with nonholonomic dynamics and another on quadrator helicopters An online, Python-based toolbox that accompanies the contents covered in the book, as well as the necessary code and data Model-Based Reinforcement Learning is a useful reference for senior undergraduate students, graduate students, research assistants, professors, process control engineers, and roboticists.

Advanced Control Methods in Marine Robotics Applications Springer Nature

The significantly expanded and updated new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence. Reinforcement learning, one of the most active research areas in artificial intelligence, is a computational approach to learning whereby an agent tries to maximize the total amount of reward it receives while interacting with a complex, uncertain environment. In Reinforcement Learning, Richard Sutton and Andrew Barto provide a clear and simple account of the field's key ideas and algorithms. This second edition has been significantly expanded and updated, presenting new topics and updating coverage of other topics. Like the first edition, this second edition focuses on core online learning algorithms, with the more mathematical material set off in shaded boxes. Part I

covers as much of reinforcement learning as possible without going beyond the tabular case for which exact solutions can be found. Many algorithms presented in this part are new to the second edition, including UCB, Expected Sarsa, and Double Learning. Part II extends these ideas to function approximation, with new sections on such topics as artificial neural networks and the Fourier basis, and offers expanded treatment of off-policy learning and policy-gradient methods. Part III has new chapters on reinforcement learning's relationships to psychology and neuroscience, as well as an updated case-studies chapter including AlphaGo and AlphaGo Zero, Atari game playing, and IBM Watson's wagering strategy. The final chapter discusses the future societal impacts of reinforcement learning.

Animal Learning & Behavior John Wiley & Sons

This book focuses on vibration suppression of flexible three-dimensional Euler–Bernoulli beams modeled by PDEs. Boundary control strategy and several control methods are proposed to stabilize the closed-loop system. Besides, some common engineering problems such as input constraint and output constraint are also considered in the control scheme design. This book offers a comprehensive introduction of the modeling process, controller design, stability analysis and numerical simulation. The detailed MATLAB codes in each

chapter are also provided, which can make readers better understand the control flow of the system. This book is mainly targeted for researchers, senior undergraduate students and postgraduate students in the field of control theory and control engineering.
Deep Reinforcement Learning with Guaranteed Performance Springer Nature
This book presents a class of novel optimal control methods and games schemes based on adaptive dynamic programming techniques. For systems with one control input, the ADP-based optimal control is designed for different objectives, while for systems with multi-players, the optimal control inputs are proposed based on games. In order to verify the effectiveness of the proposed methods, the book analyzes the properties of the adaptive dynamic programming methods, including convergence of the iterative value functions and the stability of the system under the iterative control laws. Further, to substantiate the mathematical analysis, it presents various application examples, which provide reference to real-world practices.
Wescon/95 Frontiers Media SA
This book discusses methods and algorithms for the near-optimal adaptive control of nonlinear systems, including the corresponding theoretical analysis and simulative examples, and presents two innovative methods

for the redundancy resolution of redundant manipulators with consideration of parameter uncertainty and periodic disturbances. It also reports on a series of systematic investigations on a near-optimal adaptive control method based on the Taylor expansion, neural networks, estimator design approaches, and the idea of sliding mode control, focusing on the tracking control problem of nonlinear systems under different scenarios. The book culminates with a presentation of two new redundancy resolution methods; one addresses adaptive kinematic control of redundant manipulators, and the other centers on the effect of periodic input disturbance on redundancy resolution. Each self-contained chapter is clearly written, making the book accessible to graduate students as well as academic and industrial researchers in the fields of adaptive and optimal control, robotics, and dynamic neural networks.

The Engineering Index Annual Springer Mathematics—Advances in Research and Application: 2012 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Mathematics. The editors have built Mathematics—Advances in Research and Application: 2012 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Mathematics in this

eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Mathematics—Advances in Research and Application: 2012 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at http://www.ScholarlyEditions.com/.

Reinforcement Learning for Optimal Feedback Control Elsevier

A comprehensive look at state-of-the-art ADP theory and real-world applications This book fills a gap in the literature by providing a theoretical framework for integrating techniques from adaptive dynamic programming (ADP) and modern nonlinear control to address data-driven optimal control design challenges arising from both parametric and dynamic uncertainties. Traditional model-based approaches leave much to be desired when addressing the challenges posed by the ever-increasing complexity of real-world engineering systems. An alternative which has received much interest in recent years are biologically-inspired approaches, primarily RADP. Despite their

growing popularity worldwide, until now books on ADP have focused nearly exclusively on analysis and design, with scant consideration given to how it can be applied to address robustness issues, a new challenge arising from dynamic uncertainties encountered in common engineering problems. Robust Adaptive Dynamic Programming zeros in on the practical concerns of engineers. The authors develop RADP theory from linear systems to partially-linear, large-scale, and completely nonlinear systems. They provide in-depth coverage of state-of-the-art applications in power systems, supplemented with numerous real-world examples implemented in MATLAB. They also explore fascinating reverse engineering topics, such how ADP theory can be applied to the study of the human brain and cognition. In addition, the book: Covers the latest developments in RADP theory and applications for solving a range of systems' complexity problems Explores multiple real-world implementations in power systems with illustrative examples backed up by reusable MATLAB code and Simulink block sets Provides an overview of nonlinear control, machine learning, and dynamic control Features discussions of novel applications for RADP theory, including an entire chapter on how it can be used as a computational mechanism of human movement control Robust Adaptive Dynamic

Programming is both a valuable working resource and an intriguing exploration of contemporary ADP theory and applications for practicing engineers and advanced students in systems theory, control engineering, computer science, and applied mathematics.

Proceedings of the 1995 World Congress on Neural Networks Springer

This monograph describes the use of principles of reinforcement learning (RL) to design feedback policies for continuous-time dynamical systems that combine features of adaptive control and optimal control. In a control engineering context, RL bridges the gap between traditional optimal control and adaptive control algorithms.The authors give an insightful introduction to reinforcement learning techniques that can address various control problems. In this context, they give a detailed description of techniques such as Game-Theoretic Learning, Q-learning, and Intermittent RL; with each chapter providing a self-contained exposition of the topic and giving the reader suggestions for further reading. Finally, the authors demonstrate the application of the techniques in autonomous vehicles.This review of a topic that is rapidly becoming ubiquitous in many engineering systems enables to reader dip in and out of the topic to quickly understand the essentials and provides the starting point for further research.

Morphing Aerospace

Vehicles and Structures Springer Nature
Fiber-reinforced Nanocomposites: Fundamentals and Applications explores the fundamental concepts and emerging applications of fiber-reinforced nanocomposites in the automobile, aerospace, transportation, construction, sporting goods, optics, electronics, acoustics and environmental sector. In addition, the book provides a detailed overview of the properties of fiber-reinforced nanocomposites, including discussion on embedding these high-strength fibers in matrices. Due to the mismatch in structure, density, strain and thermal expansion coefficients between matrix and fibers, their thermo-mechanical properties strongly depend not only on the preparative methods, but also on the interaction between reinforcing phase and matrix phase. This book offers a concise overview of these advances and how they are leading to the creation of stronger, more durable classes of nanocomposite materials. Explores the interaction between fiber, nanoreinforcers and matrices at the nanoscale Shows how the properties of fiber-enforced nanocomposites are ideal for use for a variety of consumer products Outlines the major challenges to creating fiber-reinforced nanocomposites effectively
Psychology of Learning and Motivation John Wiley

& Sons
This book presents the proceedings of the 17th Chinese Intelligent Systems Conference, held in Fuzhou, China, on Oct 16-17, 2021. It focuses on new theoretical results and techniques in the field of intelligent systems and control. This is achieved by providing in-depth study on a number of major topics such as Multi-Agent Systems, Complex Networks, Intelligent Robots, Complex System Theory and Swarm Behavior, Event-Triggered Control and Data-Driven Control, Robust and Adaptive Control, Big Data and Brain Science, Process Control, Intelligent Sensor and Detection Technology, Deep learning and Learning Control Guidance, Navigation and Control of Flight Vehicles and so on. The book is particularly suited for readers who are interested in learning intelligent system and control and artificial intelligence. The book can benefit researchers, engineers, and graduate students.

Handbook of Computational Economics
Routledge
There are many methods of stable controller design for nonlinear systems. In seeking to go beyond the minimum requirement of stability, Adaptive Dynamic Programming in Discrete Time approaches the challenging topic of optimal control for nonlinear systems using the tools of adaptive dynamic programming (ADP). The range of systems treated is extensive; affine, switched, singularly

perturbed and time-delay nonlinear systems are discussed as are the uses of neural networks and techniques of value and policy iteration. The text features three main aspects of ADP in which the methods proposed for stabilization and for tracking and games benefit from the incorporation of optimal control methods: • infinite-horizon control for which the difficulty of solving partial differential Hamilton–Jacobi–Bellman equations directly is overcome, and proof provided that the iterative value function updating sequence converges to the infimum of all the value functions obtained by admissible control law sequences; • finite-horizon control, implemented in discrete-time nonlinear systems showing the reader how to obtain suboptimal control solutions within a fixed number of control steps and with results more easily applied in real systems than those usually gained from infinite-horizon control; • nonlinear games for which a pair of mixed optimal policies are derived for solving games both when the saddle point does not exist, and, when it does, avoiding the existence conditions of the saddle point. Non-zero-sum games are studied in the context of a single network scheme in which policies are obtained guaranteeing system stability and minimizing the individual performance function yielding a Nash equilibrium. In order to make the coverage suitable for the student as

well as for the expert reader, Adaptive Dynamic Programming in Discrete Time: • establishes the fundamental theory involved clearly with each chapter devoted to a clearly identifiable control paradigm; • demonstrates convergence proofs of the ADP algorithms to deepen understanding of the derivation of stability and convergence with the iterative computational methods used; and • shows how ADP methods can be put to use both in simulation and in real applications. This text will be of considerable interest to researchers interested in optimal control and its applications in operations research, applied mathematics computational intelligence and engineering. Graduate students working in control and operations research will also find the ideas presented here to be a source of powerful methods for furthering their study.

Output Feedback Reinforcement Learning Control for Linear Systems

Frontiers Media SA

Model-Based Reinforcement Learning

Explore a comprehensive and practical approach to reinforcement learning Reinforcement learning is an essential paradigm of machine learning, wherein an intelligent agent performs actions that ensure optimal behavior from devices. While this paradigm of machine learning has gained tremendous success and popularity in recent years, previous scholarship has focused either on theory—optimal control

and dynamic programming – or on algorithms—most of which are simulation-based. Model-Based Reinforcement Learning provides a model-based framework to bridge these two aspects, thereby creating a holistic treatment of the topic of model-based online learning control. In doing so, the authors seek to develop a model-based framework for data-driven control that bridges the topics of systems identification from data, model-based reinforcement learning, and optimal control, as well as the applications of each. This new technique for assessing classical results will allow for a more efficient reinforcement learning system. At its heart, this book is focused on providing an end-to-end framework—from design to application—of a more tractable model-based reinforcement learning technique. Model-Based Reinforcement Learning readers will also find: A useful textbook to use in graduate courses on data-driven and learning-based control that emphasizes modeling and control of dynamical systems from data Detailed comparisons of the impact of different techniques, such as basic linear quadratic controller, learning-based model predictive control, model-free reinforcement learning, and structured online learning Applications and case studies on ground vehicles with nonholonomic dynamics and another on quadrator helicopters An online,

Python-based toolbox that accompanies the contents covered in the book, as well as the necessary code and data Model-Based Reinforcement Learning is a useful reference for senior undergraduate students, graduate students, research assistants, professors, process control engineers, and roboticists.

Advances in Automation and Robotics Research

Springer Nature

This book gathers the proceedings of the 3rd Latin American Congress on Automation and Robotics, held at Monterrey, Mexico, on November 17–19, 2021. This book presents recent advances in the modeling, design, control, and development of autonomous and robotic systems and explores current exciting applications and future challenges of these technologies. The scope of this book covers a wide range of research fields associated with automation and robotics encountered within engineering, scientific research, and practice. These topics are related to autonomous systems, industrial automation and robotics, modelling and systems identification, simulation procedures and experimental validations, control theory, artificial intelligence, computer vision, sensing and sensor fusion, multi-robot and multi-agent systems, field and service robotics, human robot interaction and interfaces, modelling of robotic systems, and the design of new robotic platforms.

Sign-tracking Springer
The four volume set LNCS 9489, LNCS 9490, LNCS 9491, and LNCS 9492 constitutes the proceedings of the 22nd International Conference on Neural Information Processing, ICONIP 2015, held in Istanbul, Turkey, in November 2015. The 231 full papers presented were carefully reviewed and selected from 375 submissions. The 4 volumes represent topical sections containing articles on Learning Algorithms and Classification Systems; Artificial Intelligence and Neural Networks: Theory, Design, and Applications; Image and Signal Processing; and Intelligent Social Networks.
Railway Track and Structures John Wiley & Sons
Centered around major topic areas of both theoretical and practical importance, the World Congress on Neural Networks provides its registrants -- from a diverse background encompassing industry, academia, and government -- with the latest research and applications in the neural network field.
Reinforcement Learning, second edition MIT Press
Since its creation in 1884, Engineering Index has covered virtually every major engineering innovation from around the world. It serves as the historical record of virtually every major engineering innovation of the 20th century. Recent content is a vital resource for current awareness, new production information, technological forecasting and

competitive intelligence. The world?s most comprehensive interdisciplinary engineering database, Engineering Index contains over 10.7 million records. Each year, over 500,000 new abstracts are added from over 5,000 scholarly journals, trade magazines, and conference proceedings. Coverage spans over 175 engineering disciplines from over 80 countries. Updated weekly.

Human-Robot Interaction Control Using Reinforcement Learning

John Wiley & Sons

Reinforcement Learning for Optimal Feedback Control develops model-based and data-driven reinforcement learning methods for solving optimal control problems in nonlinear deterministic dynamical systems. In order to achieve learning under uncertainty, data-driven methods for identifying system models in real-time are also developed. The book illustrates the advantages gained from the use of a model and the use of previous experience in the form of recorded data through simulations and experiments. The book’s focus on deterministic systems allows for an in-depth Lyapunov-based analysis of the performance of the methods described during the learning phase and during execution. To yield an approximate optimal controller, the authors focus on theories and methods that fall under the umbrella of actor–critic methods for machine learning. They concentrate on establishing stability

during the learning phase and the execution phase, and adaptive model-based and data-driven reinforcement learning, to assist readers in the learning process, which typically relies on instantaneous input-output measurements. This monograph provides academic researchers with backgrounds in diverse disciplines from aerospace engineering to computer science, who are interested in optimal reinforcement learning functional analysis and functional approximation theory, with a good introduction to the use of model-based methods. The thorough treatment of an advanced treatment to control will also interest practitioners working in the chemical-process and power-supply industry.

Synchronous Reinforcement Learning-Based Control for Cognitive Autonomy

Institute of Electrical & Electronics Engineers(IEEE)

Defines learning and shows how the learning process is studied. Clearly written and user-friendly, Introduction to the Theories of Learning places learning in its historical perspective and provides appreciation for the figures and theories that have shaped 100 years of learning theory research. The 9th edition has been updated with the most current research in the field. With Pearson's MySearchLab with interactive eText and Experiment's Tool, this program is more user-friendly than ever. Learning Goals Upon completing this book, readers should be able to:

Define learning and show how the learning process is studied Place learning theory in historical perspective Present essential features of the major theories of learning with implications for educational practice Note: MySearchLab does not come automatically packaged with this text. To purchase MySearchLab, please visit: www.mysearchlab.com or you can purchase a ValuePack of the text + MySearchLab (at no additional cost).

Proceedings of 2021 Chinese Intelligent Systems Conference ScholarlyEditions Morphing Aerospace Vehicles and Structures provides a highly timely presentation of the state-of-the-art, future directions and technical requirements of morphing aircraft. Divided into three sections it addresses morphing aircraft, bio-inspiration, and smart structures with specific focus on the flight control, aerodynamics, bio-mechanics, materials, and structures of these vehicles as well as power requirements and the use of advanced piezo materials and smart actuators. The tutorial approach adopted by the contributors, including underlying concepts and mathematical formulations, unifies the methodologies and tools required to provide practicing engineers and applied researchers with the insight to synthesize morphing air vehicles and morphing structures, as well as offering direction for future research.