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The leading and most up-to-date textbook on the far-ranging algorithmic methododogy of Dynamic Programming, which can be used for optimal control, Markovian decision problems, planning and sequential decision making under uncertainty, and discrete/combinatorial optimization. The treatment focuses on basic unifying themes, and conceptual foundations.

Textbook: Dynamic Programming and Optimal Control
mizing uin (1.3) is the optimal control u(x;t) and values of x0;:::;x t 1 are irrelevant. The optimality equation (1.3) is also called the dynamic programming equa-tion (DP) or Bellman equation. 1.5 Example: optimization of consumption An investor receives annual income of x t pounds in year t. He consumes u t and adds x t u t to his capital, 0 u t x t. The capital is invested at interest rate 100%,

Dynamic Programming and Optimal Control
Dynamic Programming and Optimal Control, Vol. I, 4th Edition PDF. September 5, 2017. 2 min read. Book Description: This 4th edition is a major revision of Vol. I of the leading two-volume dynamic programming textbook by Bertsekas, and contains a substantial amount of new material, particularly on approximate DP in Chapter 6.

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Dynamic Programming and Optimal Control, Vol. I (400 pages) and II (304 pages); published by Athena Scientific, 1995. This book develops in depth dynamic programming, a central algorithmic method for optimal control, sequential decision making under uncertainty, and combinatorial optimization.

Dynamic Programming and Optimal Control
f (t, x, u) dt = Z T. 0. [f (t, x, u) + λg (t, x, u) + xλ 0] dt − λ (T) x (T) + λ (0) x (0) . Let. • u ∗ (t) be an optimal control, • u ∗ (t) + ²h (t) a comparison control ...

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Dynamic Programming and Optimal Control 4th Edition, Volume II
The purpose of the book is to consider large and challenging multistage decision problems, which can be solved in principle by dynamic programming and optimal control, but their exact solution is computationally intractable. We discuss solution methods that rely on approximations to produce suboptimal policies with adequate performance.

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Abstract In this paper, a novel optimal control design scheme is proposed for continuous-time nonaffine nonlinear dynamic systems with unknown dynamics by adaptive dynamic programming (ADP). The proposed methodology iteratively updates the control policy online by using the state and input information without identifying the system dynamics.

Adaptive dynamic programming and optimal control of ...
Dynamic programming is both a mathematical optimization method and a computer programming method. The method was developed by Richard Bellman in the 1950s and has found applications in numerous fields, from aerospace engineering to economics. In both contexts it refers to simplifying a complicated problem by breaking it down into simpler sub-problems in a recursive manner. While some decision problems cannot be taken apart this way, decisions that span several points in time do often break apart

A research monograph providing a synthesis of old research on the foundations of dynamic programming, with the modern theory of approximate dynamic programming and new research on semicontractive models. It aims at a unified and economical development of the core theory and algorithms of total cost sequential decision problems, based on the strong connections of the subject with fixed point theory. The analysis focuses on the abstract mapping that underlies dynamic programming and defines the mathematical character of the associated problem. The discussion centers on two fundamental properties that this mapping may have: monotonicity and (weighted sup-norm) contraction. It turns out that the nature of the analytical and algorithmic DP theory is determined primarily by the presence or absence of these two properties, and the rest of the problem's structure is largely inconsequential. New research is focused on two areas: 1) The ramifications of these properties in the context of algorithms for approximate dynamic programming, and 2) The new class of semicontractive models, exemplified by stochastic shortest path problems, where some but not all policies are contractive. The 2nd edition aims primarily to amplify the presentation of the semicontractive models of Chapter 3 and Chapter 4 of the first (2013) edition, and to supplement it with a broad spectrum of research results that I obtained and published in journals and reports since the first edition was written (see below). As a result, the size of this material more than doubled, and the size of the book increased by nearly 40%. The book is an excellent supplement to several of our books: Dynamic Programming and Optimal Control (Athena Scientific, 2017), and Neuro-Dynamic Programming (Athena Scientific, 1996).

This book covers the most recent developments in adaptive dynamic programming (ADP). The text begins with a thorough background review of ADP making sure that readers are sufficiently familiar with the fundamentals. In the core of the book, the authors address first discrete- and then continuous-time systems. Coverage of discrete-time systems starts with a more general form of value iteration to demonstrate its convergence, optimality, and stability with complete and thorough theoretical analysis. A more realistic form of value iteration is studied where value function approximations are assumed to have finite errors. Adaptive Dynamic Programming also details another avenue of the ADP approach: policy iteration. Both basic and generalized forms of policy-iteration-based ADP are studied with complete and thorough theoretical analysis in terms of convergence, optimality, stability, and error bounds. Among continuous-time systems, the control of affine and nonaffine nonlinear systems is studied using the ADP approach which is then extended to other branches of control theory including decentralized control, robust and guaranteed cost control, and game theory. In the last part of the book the real-world significance of ADP theory is presented, focusing on three application examples developed from the authors' work: • renewable energy scheduling for smart power grids;• coal gasification processes; and• water–gas shift reactions. Researchers studying intelligent control methods and practitioners looking to apply them in the chemical-process and power-supply industries will find much to interest them in this thorough treatment of an advanced approach to control.

Providing an introduction to stochastic optimal control in infinite dimension, this book gives a complete account of the theory of second-order HJB equations in infinite-dimensional Hilbert spaces, focusing on its applicability to associated stochastic optimal control problems. It features a general introduction to optimal stochastic control, including basic results (e.g. the dynamic programming principle) with proofs, and provides examples of applications. A complete and up-to-date exposition of the existing theory of viscosity solutions and regular solutions of second-order HJB equations in Hilbert spaces is given, together with an extensive survey of other methods, with a full bibliography. In particular, Chapter 6, written by M. Fuhrman and G. Tessitore, surveys the theory of regular solutions of HJB equations arising in infinite-dimensional stochastic control, via BSDEs. The book is of interest to both pure and applied researchers working in the control theory of stochastic PDEs, and in PDEs in infinite dimension. Readers from other fields who want to learn the basic theory will also find it useful. The prerequisites are: standard functional analysis, the theory of semigroups of operators and its use in the study of PDEs, some knowledge of the dynamic programming approach to stochastic optimal control problems in finite dimension, and the basics of stochastic analysis and stochastic equations in infinite-dimensional spaces.

Upper-level undergraduate text introduces aspects of optimal control theory: dynamic programming, Pontryagin's minimum principle, and numerical techniques for trajectory optimization. Numerous figures, tables. Solution guide available upon request. 1970 edition.

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.

Since its initial publication, this text has defined courses in dynamic optimization taught to economics and management science students. The two-part treatment covers the calculus of variations and optimal control. 1998 edition.