Stochastic Control of Partially Observable Systems

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Stochastic Control Of Partially Observable Systems:

    Stochastic Control of Partially Observable Systems Alain Bensoussan,2004-11-11 The problem of stochastic control of partially observable systems plays an important role in many applications All real problems are in fact of this type and deterministic control as well as stochastic control with full observation can only be approximations to the real world This justifies the importance of having a theory as complete as possible which can be used for numerical implementation This book first presents those problems under the linear theory that may be dealt with algebraically Later chapters discuss the nonlinear filtering theory in which the statistics are infinite dimensional and thus approximations and perturbation methods are developed   **Algorithms for Stochastic Finite Memory Control of Partially Observable Systems** Gaurav Marwah,2005 A partially observable Markov decision process POMDP is a mathematical framework for planning and control problems in which actions have stochastic effects and observations provide uncertain state information It is widely used for research in decision theoretic planning and reinforcement learning To cope with partial observability a policy or plan must use memory and previous work has shown that a finite state controller provides a good policy representation This thesis considers a previously developed bounded policy iteration algorithm for POMDPs that finds policies that take the form of stochastic finite state controllers Two new improvements of this algorithm are developed First improvement provides a simplification of the basic linear program which is used to find improved controllers This results in a considerable speed up in efficiency of the original algorithm Secondly a branch and bound algorithm for adding the best possible node to the controller is presented which provides an error bound and a test for global optimality Experimental results show that these enhancements significantly improve the algorithm s performance   Optimal Control of Partially Observable Stochastic Systems with an Exponential-of-integral Performance Index Alain Bensoussan,J. H. van Schuppen,1983   **Stochastic Control of Partially Observable** Alain Bensoussan,1992   *Hidden Markov Processes and Adaptive Filtering* Yury A. Kutoyants,2025-11-17 This book is devoted to the problem of adaptive filtering for partially observed systems depending on unknown parameters Adaptive filters are proposed for a wide variety of models Gaussian and conditionally Gaussian linear models of diffusion processes some nonlinear models telegraph signals in white Gaussian noise all in continuous time and autoregressive processes observed in white noise discrete time The properties of the estimators and adaptive filters are described in the asymptotics of small noise or large samples The parameter estimators and adaptive filters have a recursive structure which makes their numerical realization relatively simple The question of the asymptotic efficiency of the adaptive filters is also discussed Readers will learn how to construct Le Cam s One step MLE for all these models and how this estimator can be transformed into an asymptotically efficient estimator process which has a recursive structure The last chapter covers several applications of the developed method to such problems as localization of fixed and moving sources on the plane by observations registered by K detectors estimation of a signal in noise identification of a security price process

change point problems for partially observed systems and approximation of the solution of BSDEs Adaptive filters are presented for the simplest one dimensional observations and state equations known initial values non correlated noises etc However the proposed constructions can be extended to a wider class of models and the One step MLE processes can be used in many other problems where the recursive evolution of estimators is an important property The book will be useful for students of filtering theory both undergraduates discrete time models and postgraduates continuous time models The method described preliminary estimator One step MLE process adaptive filter will also be of interest to engineers and researchers working with partially observed models **Optimal Control Theory** Suresh P. Sethi,2022-01-03 This new 4th edition offers an introduction to optimal control theory and its diverse applications in management science and economics It introduces students to the concept of the maximum principle in continuous as well as discrete time by combining dynamic programming and Kuhn Tucker theory While some mathematical background is needed the emphasis of the book is not on mathematical rigor but on modeling realistic situations encountered in business and economics It applies optimal control theory to the functional areas of management including finance production and marketing as well as the economics of growth and of natural resources In addition it features material on stochastic Nash and Stackelberg differential games and an adverse selection model in the principal agent framework Exercises are included in each chapter while the answers to selected exercises help deepen readers understanding of the material covered Also included are appendices of supplementary material on the solution of differential equations the calculus of variations and its ties to the maximum principle and special topics including the Kalman filter certainty equivalence singular control a global saddle point theorem Sethi Skiba points and distributed parameter systems Optimal control methods are used to determine optimal ways to control a dynamic system The theoretical work in this field serves as the foundation for the book in which the author applies it to business management problems developed from his own research and classroom instruction The new edition has been refined and updated making it a valuable resource for graduate courses on applied optimal control theory but also for financial and industrial engineers economists and operational researchers interested in applying dynamic optimization in their fields **Measure-Valued Processes in the Control of Partially-Observable Stochastic Systems** Wendell H. Fleming,BROWN UNIV PROVIDENCE R I LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS.,1979 This paper is concerned with the optimal control of continuous time Markov processes The admissible control laws are based on white noise corrupted observations of a function on the state processes A separated control problem is introduced whose states are probability measures on the original state space The original and separated control problems are related via the nonlinear filter equation The existence of a minimum for the separated problem is established Under more restrictive assumptions it is shown that the minimum expected cost for the separated problem equals the infimum of expected costs for the original problem with partially observed states Stochastics in Finite and Infinite Dimensions Takeyuki Hida,Rajeeva L. Karandikar,Hiroshi Kunita,Balram S.

Rajput,Shinzo Watanabe,Jie Xiong,2012-12-06 During the last fifty years Gopinath Kallianpur has made extensive and significant contributions to diverse areas of probability and statistics including stochastic finance Fisher consistent estimation non linear prediction and filtering problems zero one laws for Gaussian processes and reproducing kernel Hilbert space theory and stochastic differential equations in infinite dimensions To honor Kallianpur s pioneering work and scholarly achievements a number of leading experts have written research articles highlighting progress and new directions of research in these and related areas This commemorative volume dedicated to Kallianpur on the occasion of his seventy fifth birthday will pay tribute to his multi faceted achievements and to the deep insight and inspiration he has so graciously offered his students and colleagues throughout his career Contributors to the volume S Aida N Asai K B Athreya R N Bhattacharya A Budhiraja P S Chakraborty P Del Moral R Elliott L Gawarecki D Goswami Y Hu J Jacod G W Johnson L Johnson T Koski N V Krylov I Kubo H H Kuo T G Kurtz H J Kushner V Mandrekar B Margolius R Mikulevicius I Mitoma H Nagai Y Ogura K R Parthasarathy V Perez Abreu E Platen B V Rao B Rozovskii I Shigekawa K B Sinha P Sundar M Tomisaki M Tsuchiya C Tudor W A Woycynski J Xiong **ALGORITHMS FOR STOCHASTIC FINITE MEMORY CONTROL OF PARTIALLY OBSERVABLE SYSTEMS.** ,2005 A partially observable Markov decision process POMDP is a mathematical framework for planning and control problems in which actions have stochastic effects and observations provide uncertain state information It is widely used for research in decision theoretic planning and reinforcement learning % To cope with partial observability a policy or plan must use memory and previous work has shown that a finite state controller provides a good policy representation This thesis considers a previously developed bounded policy iteration algorithm for POMDPs that finds policies that take the form of stochastic finite state controllers Two new improvements of this algorithm are developed First improvement provides a simplification of the basic linear program which is used to find improved controllers This results in a considerable speed up in efficiency of the original algorithm Secondly a branch and bound algorithm for adding the best possible node to the controller is presented which provides an error bound and a test for global optimality Experimental results show that these enhancements significantly improve the algorithm s performance Optimization of Dynamical Systems with Impulse Controls and Shocks Boris Miller,Evgeny Rubinovich,2024-09-19 This text explores the state of the art in the rapidly developing theory of impulse control and introduces the theory of singular space time transformations a new method for studying shock mechanical systems Two approaches in the theory of impulse control are presented The first more traditional approach defines the impulsive action as a discontinuity of phase coordinates depending on the current time the state preceding the action and its magnitude The second requires the use of modern methods for describing dynamical systems differential equations with measures The impulse is treated as an idealization of a very short action of high magnitude which produces an almost abrupt change of phase coordinates The relation between these two approaches is also discussed and several applications both traditional and emerging are considered This text is intended for

graduate students and researchers in control engineering and optimal control theory for dynamical systems Readers are assumed to be familiar with the theory of ODEs optimal control and functional analysis though an appendix is included that covers many of the necessary mathematical concepts **Hybrid Systems V** Panos J. Antsaklis,1999-02-24 This book constitutes the strictly refereed post proceedings of the 5th International Hybrid Systems Workshop held in Notre Dame Indiana USA in September 1998 The 23 revised full papers presented in the book have gone through two rounds of thorough reviewing and revision The volume presents state of the art research results and particularly addresses such areas as program verification concurrent and distributed processes logic programming logics of programs discrete event simulation calculus of variations optimization differential geometry Lie algebras automata theory dynamical systems etc **The Robust Maximum Principle** Vladimir G. Boltyanski,Alexander S. Poznyak,2011-11-06 Covering some of the key areas of optimal control theory OCT a rapidly expanding field the authors use new methods to set out a version of OCT s more refined maximum principle The results obtained have applications in production planning reinsurance dividend management multi model sliding mode control and multi model differential games This book explores material that will be of great interest to post graduate students researchers and practitioners in applied mathematics and engineering particularly in the area of systems and control *Feedback Strategies for Partially Observable Stochastic Systems* Yaakov Yavin,1983 Optimal Bang-bang Control of Partially Observable Stochastic Systems Yakoov Yavin,G. Reuter,1980 **Operations Research '91** Peter Gritzmann,Rainer Hettich,Reiner Horst,Ekkehard Sachs,2012-12-06 The volume comprises a collection of 172 extented abstracts of talks presented at the 16th Symposium on Operations Rese arch held at the University of Trier in September 1991 It is designated to serve as a quickly published documentation of the scientific activities of the conference Subjects and areas touched upon include theory modelling and computational methods in optimization combinatorial op timization and discrete mathematics combinatorial problems in VLSI scientific computing stochastic and dynamic opti mization queuing scheduling stochastics and econometrics mathematical economics and game theory utility risk insu rance financial engineering computer science in business and economics knowledge engineering and production and ma nufacturing *Optimal Control and Partial Differential Equations* José Luis Menaldi,Edmundo Rofman,Agnès Sulem,2001 Limiting discounted-cost control of partially observable stochastic systems Jesús Barreiro Hurlé,1999 Determination of Optimal Controls for Partially Observable Stochastic Systems with Non Classical Information Pattern C. W. Chia,Imperial College of Science and Technology,1970 *Stochastic Differential Systems* Hans Jürgen Engelbert,Wolfgang Schmidt,1987 Proceedings of the Joint Automatic Control Conference ,1980

Decoding **Stochastic Control Of Partially Observable Systems**: Revealing the Captivating Potential of Verbal Expression

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