1. Record Nr. UNINA9910874687003321

Autore	Hinrichs Aicke
Titolo	Monte Carlo and Quasi-Monte Carlo Methods : MCQMC 2022, Linz, Austria, July 17-22
Pubbl/distr/stampa	Cham : , : Springer International Publishing AG, , 2024 ©2024
ISBN	9783031597626 9783031597619
Edizione	[1st ed.]
Descrizione fisica	1 online resource (657 pages)
Collana	Springer Proceedings in Mathematics and Statistics Series ; ; v.460
Altri autori (Persone)	KritzerPeter PillichshammerFriedrich
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Contents -- Invited Articles -- Quasi Continuous Level Monte Carlo for Random Elliptic PDEs -- 1 Introduction -- 2 Multilevel and Continuous Level Monte Carlo Method -- 2.1 Multilevel Monte Carlo Method -- 2.2 Optimal MSE Weight -- 2.3 MLMC on the Fly Algorithm -- 2.4 Continuous Level Monte Carlo Method -- 2.5 Optimal Exponential Distribution Parameter -- 2.6 CLMC on the Fly Algorithm -- 3 Quasi Continuous Level Monte Carlo Method -- 4 Random PDE Model -- 4.1 Pathwise Weak Formulation -- 4.2 Finite Element Approximation -- 5 A-Posteriori Error Estimation -- 6 Numerical Experiments -- 6.1 Samplewise Convergence on Standard Uniform Versus Adaptively Refined Meshes -- 6.2 MLMC Parameter Estimates -- 6.3 CLMC Parameter Estimates -- 6.4 Pseudo-Random Versus Quasi-Random Numbers -- 6.5 Performance of MLMC, CMLC and QCMLC -- References -- MLMC Techniques for Discontinuous Functions -- 1 Introduction -- 1.1 Challenge 1: Nested Expectation -- 1.2 Challenge 2: Discontinuous Payoff Function -- 2 Explicit Smoothing -- 3 Integration/Differentiation and Malliavin Calculus -- 4 Conditional Expectation -- 5 Change of Measure -- 6 Splitting -- 7 Adaptive Sampling -- 8 Conclusions -- References -- Introduction to Gaussian Process Regression in Bayesian Inverse Problems, with New Results on Experimental Design for Weighted Error Measures -- 1 Introduction --

2 Bayesian Inverse Problems and Their Approximation -- 2.1 Bayesian Inverse Problems -- 2.2 Examples of Large-Scale Complex Bayesian Inverse Problems -- 2.3 Surrogate Models -- 2.4 Error in the Surrogate-Accelerated Posterior Distribution -- 3 Gaussian Process Regression -- 3.1 Set-Up -- 3.2 Gaussian Process Regression as Surrogate Model -- 3.3 Examples of Gaussian Process Regression as Surrogate Model -- 3.4 Error in GP-Accelerated Posterior Distribution. 3.5 Error Bounds for GP Regression in Weighted Spaces -- 4 Numerical Examples -- References -- Lattice-Based Kernel Approximation and Serendipitous Weights for Parametric PDEs in Very High Dimensions -- 1 Introduction -- 2 Transforming to the Periodic Setting -- 3 The Kernel Interpolant -- 4 Kernel Interpolant for Parametric Elliptic PDEs -- 5 Seeking Better Weights -- 6 Numerical Experiments -- 6.1 Fixing the Parameters in the Weights -- 6.2 Comparing SPOD Weights with Serendipitous Weights -- 6.3 1000-Dimensional Examples -- 7 Conclusions -- References -- Optimal Algorithms for Numerical Integration: Recent Results and Open Problems -- 1 Introduction -- 2 Lower Bounds -- 3 Universality -- 4 General Domains -- 5 IID Information -- 6 Concluding Remarks -- References -- Minimum Kernel Discrepancy Estimators -- 1 Introduction -- 2 Kernels, Discrepancies, and Estimators -- 2.1 Set-Up and Notation -- 2.2 Kernel Discrepancies in Quasi Monte Carlo -- 2.3 Minimum Kernel Discrepancy Estimators -- 3 Applications -- 3.1 Generalised Method of Moments -- 3.2 Generative Adversarial Networks -- 3.3 Energy-Based Models -- 4 Asymptotic Theory -- 4.1 Strong Consistency -- 4.2 Extension to theta-Dependent Kernel -- 4.3 Asymptotic Normality -- 4.4 Related Work -- 5 Open Research Directions -- 6 Kernel Mean Embedding -- 7 Auxiliary Results -- References -- Error Estimates and Variance Reduction for Nonequilibrium Stochastic Dynamics -- 1 An Introduction to Computational Statistical Physics -- 1.1 Passing from a Microscopic to a Macroscopic Description -- 1.2 Computing Average Properties with Langevin Dynamics -- 1.3 Ergodicity Results for Langevin Dynamics -- 1.4 Variance Reduction Methods in Equilibrium Molecular Dynamics -- 2 Definition of Transport Coefficients -- 2.1 Nonequilibrium Dynamics and Their Steady States -- 2.2 The Linear Response Regime.
3 Error Estimates for the Computation of Transport Coefficients -- 3.1 Nonequilibrium Molecular Dynamics -- 3.2 Green-Kubo Formulas -- 3.3 Advantages and Limitations of Nonequilibrium Molecular Dynamics and Green-Kubo Formulas -- 4 Extensions and Perspectives -- 4.1 An Example of Alternative Fluctuation Formulas -- 4.2 Current Perspectives on Better Estimating Transport Coefficients -- References -- Contributed Articles -- Heuristics for the Probabilistic Solution of BVPs with Mixed Boundary Conditions -- 1 Introduction -- 2 Monte Carlo Solution of Second Order Linear Boundary Value Problems with Mixed BCs -- 2.1 Stochastic Representation -- 2.2 Three Schemes for Stopped-Reflected Diffusions -- 3 Example I: Mixed BCs with Smooth Solution -- 4 Example II: Accelerating the Simulation in DOT -- 5 Example III: The Motz Problem -- References -- Challenges in Developing Great Quasi-Monte Carlo Software -- 1 Introduction -- 2 Why Develop QMC Software -- 2.1 QMC Theory to Software -- 2.2 QMC Software to Theory -- 3 Integrated -- 3.1 LD Sequence Generators -- 3.2 Integrands and Variable Transformations -- 3.3 Stopping Criteria -- 4 Correct -- 5 Efficient -- 6 Accessible -- 7 Sustainable -- 8 Summary and Future Work -- References -- Numerical Computation of Risk Functionals in PDMP Risk Models -- 1 Introduction -- 2 Surplus Process with State Dependent Coefficients -- 2.1 Integral Representation of upper VV -- 3 Numerical Methods -- 3.1

Quantization -- 3.2 Monte Carlo/Quasi-Monte Carlo Method -- 4 Change of Measure -- 5 Two Applications -- 5.1 The Ruin Probability -- 5.2 The Expected Deficit at Ruin -- References -- New Bounds for the Extreme and the Star Discrepancy of Double-Infinite Matrices -- 1 Introduction -- 2 Proofs of Results -- 3 Numerical Results -- 4 Future Research -- References.
Unbiased Likelihood Estimation of Wright-Fisher Diffusion Processes -- 1 Introduction -- 2 Estimation Approach -- 3 Unbiased Monte Carlo Estimator -- 3.1 Exact Rejection Sampling of Wright-Fisher Diffusion Bridges -- 3.2 Estimation of Conditioned Neutral Wright-Fisher Diffusion Densities -- 3.3 Theoretical Guarantees -- 4 Numerical Examples -- 5 Monte Carlo Maximum Likelihood Estimator for the Coupled Wright-Fisher Diffusion -- 6 Conclusion -- References -- Theory and Construction of Quasi-Monte Carlo Rules for Asian Option Pricing and Density Estimation -- 1 Introduction -- 2 Background -- 2.1 Asian Options -- 2.2 Function Spaces -- 2.3 Quasi-Monte Carlo Methods -- 3 Smoothing by Preintegration -- 4 QMC Analysis for Asian Option with Preintegration -- 4.1 Bounds on the Derivatives of the Preintegrated Functions -- 4.2 Choosing the Weights -- 5 Numerical Results -- References -- Application of Dimension Truncation Error Analysis to High-Dimensional Function Approximation in Uncertainty Quantification -- 1 Introduction -- 1.1 Notations and Preliminaries -- 2 Problem Setting -- 3 Dimension Truncation Error -- 4 Invariance of the Dimension Truncation Rate Under Transformations of Variables -- 5 Numerical Experiments -- 6 Conclusions -- References -- Simple Stratified Sampling for Simulating Multi-dimensional Markov Chains -- 1 Introduction -- 2 Markov Chain Simulation -- 2.1 Classical Monte Carlo -- 2.2 Simple Stratified Sampling -- 3 Theoretical Convergence -- 4 Numerical Experiments -- 4.1 Diffusion -- 4.2 An Asian Option -- 5 Conclusion -- References -- Infinite-Variate upper L squaredL2-Approximation with Nested Subspace Sampling -- 1 Introduction -- 2 Function Spaces and Algorithms -- 2.1 Weighted Function Spaces -- 2.2 Algorithms, Cost Models, and Errors -- 3 ANOVA Spaces -- 4 Non-ANOVA Spaces -- References.
Randomized Complexity of Vector-Valued Approximation -- 1 Introduction -- 2 Preliminaries -- 3 An Adaptive Algorithm for Vector Valued Approximation -- 4 Lower Bounds and Complexity -- References -- Quasi-Monte Carlo Algorithms (Not Only) for Graphics Software -- 1 Introduction -- 2 Implementation of Low Discrepancy Sequences -- 2.1 Floating Point Conversion -- 2.2 Efficient Radical Inversion -- 2.3 Digital Nets and Sequences -- 2.4 Rank-1 Lattice Sequences -- 2.5 Massive Parallelization -- 2.6 Optimization -- 3 Results -- 4 Conclusion -- References -- Sequential Estimation Using Hierarchically Stratified Domains with Latin Hypercube Sampling -- 1 Introduction -- 2 Combining Stratified Sampling and Latin Hypercube Sampling -- 2.1 Stratified Sampling -- 2.2 Latin Hypercube Sampling Within Stratified Sampling -- 3 Sequential Estimation with Latin Hypercube Sampling -- 3.1 Sequential Estimation -- 3.2 Sensitivity Analysis Using Local Surrogate Methods -- 3.3 A Sobol Sensitivity Informed Sequence of Hierarchical S-LHS Estimators -- 4 Numerical Results -- 4.1 Test Cases -- 5 Conclusion -- References -- Comparison of Two Search Criteria for Lattice-Based Kernel Approximation -- 1 Introduction -- 2 Preliminaries -- 2.1 Weighted Korobov Spaces -- 2.2 The Kernel Interpolant -- 2.3 The script upper S Subscript n Superscript asterisk Baseline left parenthesis bold italic z right parenthesismathcalS*n(z) Criterion -- 3 Formulation of Search Criterion script upper P Subscript n Superscript asterisk Baseline left parenthesis bold italic z right parenthesismathcalP*n (z) -- 4 CBC

Construction Based on script upper P Subscript n Superscript asterisk Baseline left parenthesis bold italic z right parenthesismathcalP*n (z) --
5 Numerical Results -- References -- A-Posteriori QMC-FEM Error Estimation for Bayesian Inversion and Optimal Control with Entropic Risk Measure.
1 Introduction.