1. Record Nr. UNINA9910438144103321

Titolo	Sparse grids and applications / / Jochen Garcke, Michael Griebel, editors
Pubbl/distr/stampa	New York, : Springer, 2013
ISBN	3-642-31703-0
Edizione	[1st ed. 2013.]
Descrizione fisica	1 online resource (289 p.)
Collana	Lecture notes in computational science and engineering, , 1439-7358 ; ; 88
Altri autori (Persone)	GarckeJochen GriebelMichael
Disciplina	510
Soggetti	Numerical grid generation (Numerical analysis)
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references.
Nota di contenuto	Sparse Grids and Applications; Preface; Contents; Contributors; An Adaptive Sparse Grid Approach for Time Series Prediction; 1 Introduction and Problem Formulation; 2 Takens' Theorem and the Delay Embedding Scheme; 3 The Regression Problem and the Regularized Least Squares Approach; 3.1 Minimization for an Arbitrary Basis; 3.2 Minimization for a Kernel Basis in a Reproducing Kernel Hilbert Space; 4 Discretization via Sparse Grids; 4.1 Multilevel Hierarchical Bases and Regular Sparse Grids; 4.2 Space-Adaptive Sparse Grids; 4.3 Dimension-Adaptive Sparse Grids; 5 Numerical Results 5.1 Henon Map in 2d5.2 Jump Map in 5d; 5.3 Small Dataset of the ANN and CI Forecasting Competition 2006/2007; 6 Concluding Remarks; References; Efficient Analysis of High Dimensional Data in Tensor Formats; 1 Introduction; 1.1 Tensorial Quantities; 2 Discretisation of Diffusion Problem with Uncertain Coefficient; 2.1 Spatial Discretisation; 2.2 Stochastic Discretisation; 2.3 Quadrature Rules and Sparse Integration Grids; 3 The Canonical Tensor Format; 4 Analysis of High Dimensional Data; 4.1 Computation of the Maximum Norm and Corresponding Index; 4.2 Computation of the Characteristic 4.3 Computation of Level Sets, Frequency, Mean Value, and Variance4.4 Computation of the Pointwise Inverse; 5 Complexity Analysis; 6 Numerical Experiments; 7 Conclusion; References; Sparse Grids in a Nutshell; 1 Introduction; 2 Sparse Grids; 2.1 Hierarchical Subspace-

Splitting; 2.2 Properties of the Hierarchical Subspaces; 2.3 Sparse Grids; 2.4 Hierarchy Using Constant Functions; 3 Sparse Grid Combination Technique; 3.1 Optimised Combination Technique; References; Intraday Foreign Exchange Rate Forecasting Using Sparse Grids; 1 Introduction 2 Exchange Rate Forecasting as a Data Mining Problem2.1 Input Data; 2.2 Delay Embedding into a Feature Space; 2.3 Regularized Least Squares Regression; 3 Sparse Grid Discretization; 3.1 Sparse Grid Combination Technique; 4 Numerical Results; 4.1 Experimental Data; 4.2 Quality Assessment; 4.3 Forecasting Using a Single Currency Pair; 4.4 Forecasting Using Multiple Currency Pairs; 4.5 Towards a Practical Trading Strategy; 5 Conclusions; References; Dimension- and Time-Adaptive Multilevel Monte Carlo Methods; 1 Introduction; 2 Multilevel Monte Carlo Method
3 Adaptive Multilevel Monte Carlo Methods3.1 Dimension-Adaptive Algorithm; 3.2 Time-Adaptive Algorithm; 4 Numerical Results; 4.1 Dimension-Adaptive Algorithm; 4.2 Time-Adaptive Algorithm; 5 Concluding Remarks; References; An Efficient Sparse Grid Galerkin Approach for the Numerical Valuation of Basket Options Under Kou's Jump-Diffusion Model; 1 Introduction; 2 Option Pricing with Kou's Model; 2.1 One-Dimensional Model; 2.2 Multi-dimensional Case and Dependence Modelling; 2.3 Representation of the Multi-dimensional Process as Levy Process; 2.4 Option Pricing; 3 Numerical Treatment 3.1 Time Discretization and Weak Formulation

Sommario/riassunto

In the recent decade, there has been a growing interest in the numerical treatment of high-dimensional problems. It is well known that classical numerical discretization schemes fail in more than three or four dimensions due to the curse of dimensionality. The technique of sparse grids helps overcome this problem to some extent under suitable regularity assumptions. This discretization approach is obtained from a multi-scale basis by a tensor product construction and subsequent truncation of the resulting multiresolution series expansion. This volume of LNCSE is a collection of the papers from the proceedings of the workshop on sparse grids and its applications held in Bonn in May 2011. The selected articles present recent advances in the mathematical understanding and analysis of sparse grid discretization. Aspects arising from applications are given particular attention. .