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problem

Chapter 2. Nonlinear Programming; 2.1. Problem formulation; 2.2. Karush-Kuhn-Tucker conditions; 2.3. General search algorithm; 2.3.1. Main steps; 2.3.2. Computing the search direction; 2.3.3. Computation of advancement step; 2.4. Monovariate methods; 2.4.1. Coggin's method (of polynomial interpolation); 2.4.2. Golden section method; 2.5. Multivariable methods; 2.5.1. Direct search methods; 2.5.2. Gradient methods; Chapter 3. Dynamic Programming; 3.1. Principle of dynamic programming; 3.1.1. Stating the problem 3.1.2. Decision problem 3.2. Recurrence equation of optimality; 3.3. Particular cases; 3.3.1. Infinite horizon stationary problems; 3.3.2. Variable horizon problem; 3.3.3. Random horizon problem; 3.3.4. Taking into account sum-like constraints; 3.3.5. Random evolution law; 3.3.6. Initialization when the final state is imposed; 3.3.7. The case when the necessary information is not always available; 3.4. Examples; 3.4.1. Route optimization; 3.4.2. The smuggler problem; Chapter 4. Hopfield Networks; 4.1. Structure; 4.2. Continuous dynamic Hopfield networks; 4.2.1. General problem 4.2.2. Application to the traveling salesman problem 4.3. Optimization by Hopfield networks, based on simulated annealing; 4.3.1. Deterministic method; 4.3.2. Stochastic method; Chapter 5. Optimization in System Identification; 5.1. The optimal identification principle; 5.2. Formulation of optimal identification problems; 5.2.1. General problem; 5.2.2. Formulation based on optimization theory; 5.2.3. Formulation based on estimation theory (statistics); 5.3. Usual identification models; 5.3.1. General model; 5.3.2. Rational input/output (RIO) models 5.3.3. Class of autoregressive models (ARMAX) 5.3.4. Class of state space representation models; 5.4. Basic least squares method; 5.4.1. LSM type solution; 5.4.2. Geometric interpretation of the LSM solution; 5.4.3. Consistency of the LSM type solution; 5.4.4. Example of application of the LSM for an ARX model; 5.5. Modified least squares methods; 5.5.1. Recovering lost consistency; 5.5.2. Extended LSM; 5.5.3. Instrumental variables method; 5.6. Minimum prediction error method; 5.6.1. Basic principle and algorithm; 5.6.2. Implementation of the MPEM for ARMAX models 5.6.3. Convergence and consistency of MPEM type estimations

## Sommario/riassunto

The purpose of this book is to present the main methods of static and dynamic optimization. It has been written within the framework of the European Union project - ERRIC (Empowering Romanian Research on Intelligent Information Technologies), funded by the EU's FP7 Research Potential program and developed in cooperation between French and Romanian teaching researchers. Through the principles of various proposed algorithms (with additional references) this book allows the interested reader to explore various methods of implementation such as linear programming, nonlinear programming - p