

Chong, Edwin K. P.; Żak, Stanisław H.

An introduction to optimization. (English) Zbl 0865.90114

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From the introduction: The purpose of the book is to give the reader a working knowledge of optimization theory and methods. To accomplish this goal, we include numerous examples that illustrate the theory and algorithms discussed in the text. However, it is not our intention to provide a cookbook of the most recent numerical techniques for optimization; rather, our goal is to equip the reader with sufficient background for further study of advanced topics in optimization.

The material in this book is organized into four independent parts. Part I contains a review of some basic definitions, notations, and relations from linear algebra, geometry, and calculus that we use frequently throughout the book. In Part II, we consider unconstrained optimization problems. We first discuss some theoretical foundations of unconstrained optimization, including necessary and sufficient conditions for minimizers and maximizers. This is followed by a treatment of various iterative optimization algorithms, together with their properties. A discussion of genetic algorithms is included in this part. We also analyze the least-squares optimization problem and the associated recursive least-squares algorithm. Parts III and IV are devoted to constrained optimization. Part III deals with linear programming problems, which form an important class of constrained optimization problems. We give examples and analyze properties of linear programs and then discuss the simplex method for solving linear programs. We also provide a brief treatment of dual linear programming problems. We wrap up Part III by presenting non-simplex algorithms for solving linear programs, namely, Khachiyan's and Karmarkar's methods. In Part IV, we treat nonlinear constrained optimization. Here, as in Part II, we first present some theoretical foundations of nonlinear constrained optimization problems. We then discuss different algorithms for solving constrained optimization problems with equality as well as inequality constraints.

MSC:

[90C30](#) Nonlinear programming

[90C05](#) Linear programming

[90-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to operations research and mathematical programming

Cited in **3** Reviews
Cited in **6** Documents

Keywords:

[neural networks](#); [unconstrained optimization](#); [necessary and sufficient conditions](#); [genetic algorithms](#); [non-simplex algorithms](#)