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Nota di contenuto	Cover; Title Page; Copyright; Contents; Preface; PART I: Paradigmatic Problems; Chapter 1: Optimal Satisfiability; 1.1. Introduction; 1.2. Preliminaries; 1.2.1. Constraint satisfaction problems: decision and optimization versions; 1.2.2. Constraint types; 1.3. Complexity of decision problems; 1.4. Complexity and approximation of optimization problems; 1.4.1. Maximization problems; 1.4.2. Minimization problems; 1.5. Particular instances of constraint satisfaction problems; 1.5.1. Planar instances; 1.5.2. Dense instances; 1.5.3. Instances with a bounded number of occurrences 1.6. Satisfiability problems under global constraints 1.7. Conclusion; 1.8. Bibliography; Chapter 2: Scheduling Problems; 2.1. Introduction; 2.2. New techniques for approximation; 2.2.1. Linear programming and scheduling; 2.2.1.1. Single machine problems; 2.2.1.2. Problems with m machines; 2.2.2. An approximation scheme for P  Cmax; 2.3. Constraints and scheduling; 2.3.1. The monomachine constraint; 2.3.2. The cumulative constraint; 2.3.3. Energetic reasoning; 2.4. Non-regular criteria; 2.4.1. PERT with convex costs; 2.4.1.1. The equality graph and its blocks; 2.4.1.2. Generic algorithm

2.4.1.3. Complexity of the generic algorithm 2.4.2. Minimizing the early-tardy cost on one machine; 2.4.2.1. Special cases; 2.4.2.2. The lower bound; 2.4.2.3. The branch-and-bound algorithm; 2.4.2.4. Lower bounds in a node of the search tree; 2.4.2.5. Upper bound; 2.4.2.6. Branching rule; 2.4.2.7. Dominance rules; 2.4.2.8. Experimental results; 2.5. Bibliography; Chapter 3: Location Problems; 3.1. Introduction; 3.1.1. Weber's problem; 3.1.2. A classification; 3.2. Continuous problems; 3.2.1. Complete covering; 3.2.2. Maximal covering; 3.2.2.1. Fixed radius; 3.2.2.2. Variable radius 3.2.3. Empty covering 3.2.4. Bicriteria models; 3.2.5. Covering with multiple resources; 3.3. Discrete problems; 3.3.1. p-Center; 3.3.2. p-Dispersion; 3.3.3. p-Median; 3.3.3.1. Fixed charge; 3.3.4. Hub; 3.3.5. p-Maximum; 3.4. On-line problems; 3.5. The quadratic assignment problem; 3.5.1. Definitions and formulations of the problem; 3.5.2. Complexity; 3.5.3. Relaxations and lower bounds; 3.5.3.1. Linear relaxations; 3.5.3.2. Semi-definite relaxations; 3.5.3.3. Convex quadratic relaxations; 3.6. Conclusion; 3.7. Bibliography; Chapter 4: Mini Max Algorithms and Games; 4.1. Introduction 4.2. Games of no chance: the simple cases 4.3. The case of complex no chance games; 4.3.1. Approximative evaluation; 4.3.2. Horizon effect; 4.3.3. - pruning; 4.4. Quiescence search; 4.4.1. Other refinements of the Mini Max algorithm; 4.5. Case of games using chance; 4.6. Conclusion; 4.7. Bibliography; Chapter 5: Two-dimensional Bin Packing Problems; 5.1. Introduction; 5.2. Models; 5.2.1. ILP models for level packing; 5.3. Upper bounds; 5.3.1. Strip packing; 5.3.2. Bin packing: two-phase heuristics; 5.3.3. Bin packing: one-phase level heuristics 5.3.4. Bin packing: one-phase non-level heuristics

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## Sommario/riassunto

Combinatorial optimization is a multidisciplinary scientific area, lying in the interface of three major scientific domains: mathematics, theoretical computer science and management. The three volumes of the Combinatorial Optimization series aim to cover a wide range of topics in this area. These topics also deal with fundamental notions and approaches as with several classical applications of combinatorial optimization. Concepts of Combinatorial Optimization, is divided into three parts:- On the complexity of combinatorial optimization problems, presenting basics about worst-case and random

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