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3.4.5 GA Tuning Parameters and Examples 3.5 A Simple Continuous Genetic Algorithm; 3.6 Conclusion; Problems; 4 Mathematical Models of Genetic Algorithms; 4.1 Schema Theory; 4.2 Markov Chains; 4.3 Markov Model Notation for Evolutionary Algorithms; 4.4 Markov Models of Genetic Algorithms; 4.4.1 Selection; 4.4.2 Mutation; 4.4.3 Crossover; 4.5 Dynamic System Models of Genetic Algorithms; 4.5.1 Selection; 4.5.2 Mutation; 4.5.3 Crossover; 4.6 Conclusion; Problems; 5 Evolutionary Programming; 5.1 Continuous Evolutionary Programming; 5.2 Finite State Machine Optimization 5.3 Discrete Evolutionary Programming 5.4 The Prisoner's Dilemma; 5.5 The Artificial Ant Problem; 5.6 Conclusion; Problems; 6 Evolution Strategies; 6.1 The (1+1) Evolution Strategy; 6.2 The 1/5 Rule: A Derivation; 6.3 The (+l) Evolution Strategy; 6.4 (+) and (,) Evolution Strategies; 6.5 Self-Adaptive Evolution Strategies; 6.6 Conclusion; Problems; 7 Genetic Programming; 7.1 Lisp: The Language of Genetic Programming; 7.2 The Fundamentals of Genetic Programming; 7.2.1 Fitness Measure; 7.2.2 Termination Criteria; 7.2.3 Terminal Set; 7.2.4 Function Set; 7.2.5 Initialization 7.2.6 Genetic Programming Parameters 7.3 Genetic Programming for Minimum Time Control; 7.4 Genetic Programming Bloat; 7.5 Evolving Entities other than Computer Programs; 7.6 Mathematical Analysis of Genetic Programming; 7.6.1 Definitions and Notation; 7.6.2 Selection and Crossover; 7.6.3 Mutation and Final Results; 7.7 Conclusion; Problems; 8 Evolutionary Algorithm Variations; 8.1 Initialization; 8.2 Convergence Criteria; 8.3 Problem Representation Using Gray Coding; 8.4 Elitism; 8.5 Steady-State and Generational Algorithms; 8.6 Population Diversity; 8.6.1 Duplicate Individuals 8.6.2 Niche-Based and Species-Based Recombination

Sommario/riassunto

A clear and lucid bottom-up approach to the basic principles of evolutionary algorithms Evolutionary algorithms (EAs) are a type of artificial intelligence. EAs are motivated by optimization processes that we observe in nature, such as natural selection, species migration, bird swarms, human culture, and ant colonies. This book discusses the theory, history, mathematics, and programming of evolutionary optimization algorithms. Featured algorithms include genetic algorithms, genetic programming, ant colony optimization, particle swarm optimization, differential evolution, biog
