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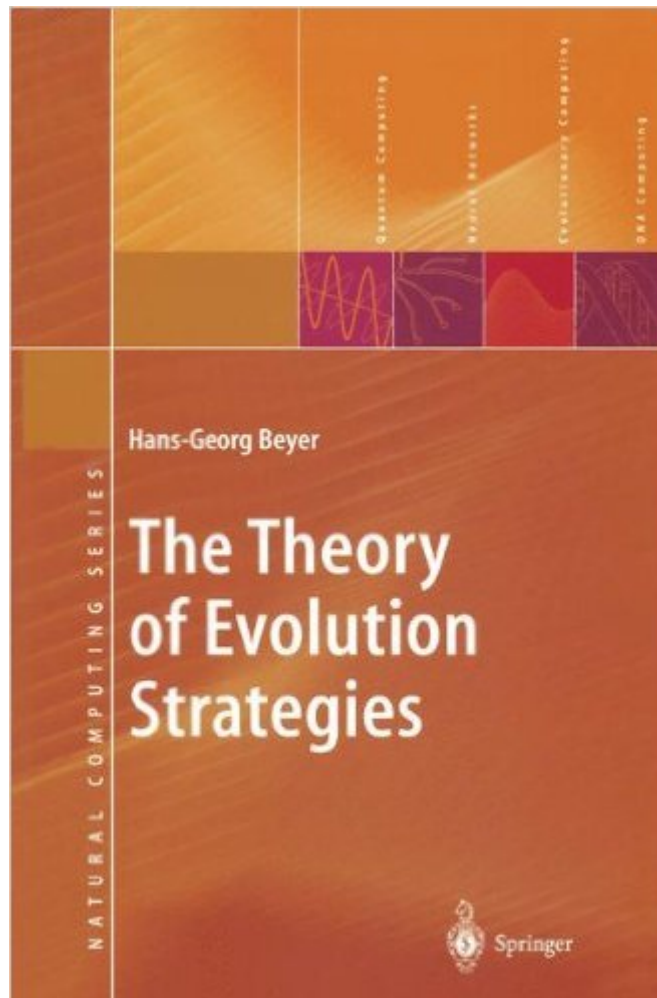
NATURAL COMPUTING SERIES

Hans-Georg Beyer

The Theory of Evolution Strategies

Springer

Synopsis

Evolutionary algorithms, such as evolution strategies, genetic algorithms, or evolutionary programming, have found broad acceptance in the last ten years. In contrast to its broad propagation, theoretical analysis in this subject has not progressed as much. This monograph provides the framework and the first steps toward the theoretical analysis of Evolution Strategies (ES). The main emphasis is deriving a qualitative understanding of why and how these ES algorithms work.

Book Information

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Customer Reviews

This is the first book that I am aware of that addresses the foundations of evolutionary and genetic algorithms, evolution strategies, and evolutionary programming from a rigorous mathematical point of view. The book is designed for an audience of mathematicians and computer scientists who are curious about evolutionary strategies and need a formal treatment of its foundations. Readers currently involved in designing and writing genetic programs will find this book helpful in the optimizing of their algorithms, even though at times they might find the presentation a little heavy-handed. Evolutionary strategies are thought of as dynamical systems in the book, but these are not in general deterministic, but probabilistic in nature. The state space of the dynamical system consists of the direct product of an object parameter space, an endogenous strategy parameter set, and a collection of fitness functions. Evolution takes place in this state space via the "genetic

operators", i.e. the selection, mutation, reproduction, and recombination operators. The goal of course is to find an optimum solution to the problem, and so a consideration of the convergence of the evolution strategy to this optimum must be addressed. These issues and others, such as the differentiation between evolutionary strategies and ordinary Monte Carlo methods, are discussed in great detail in the book. The author emphasizes that the mechanism of evolutionary strategies lies in the local properties of state space, the evolutionary process being obtained by small steps in this space. He also suggests three prerequisites for the working of evolutionary algorithms, namely the evolutionary progress principle, the genetic repair hypothesis, and mutation-induced operation by recombination.

Evolutionary Algorithms in Theory and Practice: Evolution Strategies, Evolutionary Programming, Genetic Algorithms Theory of Evolution Strategies Entropy, Information, and Evolution: New Perspective on Physical and Biological Evolution (Bradford Books) Infectious Diseases in Primates: Behavior, Ecology and Evolution (Oxford Series in Ecology and Evolution) Paul Morphy and the Evolution of Chess Theory (Dover Chess) Evolution for Everyone: How Darwin's Theory Can Change the Way We Think About Our Lives Biological Invasions: Theory and Practice (Oxford Series in Ecology and Evolution) Maximum Entropy and Ecology: A Theory of Abundance, Distribution, and Energetics (Oxford Series in Ecology and Evolution) Entropy - God's Dice Game: The book describes the historical evolution of the understanding of entropy, alongside biographies of the scientists who ... communication theory, economy, and sociology The Evolution of Biomechanics: Bringing movement theory back to life Farming In Your Backyard for Beginners Vol.2 - Use Proven Strategies to Grow Plants, Herbs, and Food in Your Backyard Easily (Best Guide To Grow Organic ... Farming, Backyard Farming Strategies) Chess: Tips, Tactics And Strategies: (Beginners, Tactics, Strategies, End Game, Openings) Chess :Chess Mastery For Beginners, Chessboard Domination Strategies,Chess Tactics,Chess Openings,Chess Strategies.
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