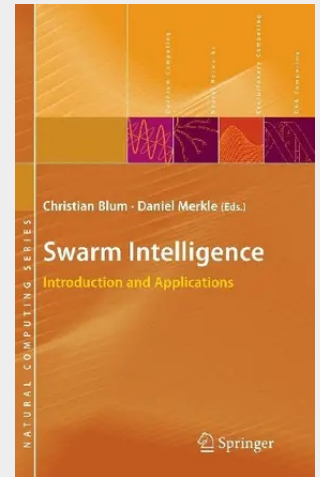


Swarm Intelligence

Introduction and Applications

The laws that govern the behavior of social insect colonies continue to mesmerize researchers. Scientists have applied the behavior of social insects in new approaches to optimization and the control of robots. This field of research is now referred to as swarm intelligence, and it is characterized by a decentralized and probabilistic way of working, the key advantages being robustness and flexibility. This edited book is intended both as an overview of swarm intelligence and as a guide to the most interesting recent developments, and thus will be of interest to both novices and experienced researchers in the field. It successfully combines an overview of swarm intelligence with an up-to-date treatment of the advances in the field.

Swarm intelligence is a modern artificial intelligence discipline that is concerned with the design of multiagent systems with applications, e.g., in optimization and in robotics. The design paradigm for these systems is fundamentally different from more traditional approaches. Instead of a sophisticated controller that governs the global behavior of the system, the swarm intelligence principle is based on many unsophisticated entities that cooperate in order to exhibit a desired behavior. Inspiration for the design of these systems is taken from the collective behavior of social insects such as ants, termites, bees, and wasps, as well as from the behavior of other animal societies such as flocks of birds or schools of fish. Colonies of social insects have mesmerized researchers for many years. However, the principles that govern their behavior remained unknown for a long time. Even though the single members of these societies are unsophisticated individuals, they are able to achieve complex tasks in cooperation. Coordinated behavior emerges from relatively simple actions or interactions between the individuals.



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