THEORETICAL FOUNDATIONS OF BIO-INSPIRED COMPUTATION

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Bio-inspired search heuristics often turn out to be highly successful for optimization in practice. The theory of these randomized search heuristics explains the success or the failure of these methods in practical applications. Theoretical analyses lead to the understanding of which problems are optimized (or approximated) efficiently by a given algorithm and which are not.

The benefits of theoretical understanding for practitioners are threefold.

1. Aiding the algorithm design,

2. guiding the choice of the best algorithm for the problem at hand,

3. determining the optimal parameter settings.

The theory of evolutionary computation has grown rapidly in recent years. The primary aim of this special session is to bring together people working on theoretical aspects of bio-inspired computation. The latest breakthroughs in the theory of bio-inspired computation will be reported and new directions will be set.

Potential authors are invited to submit papers describing original contributions to foundations of evolutionary computation. Although we are most interested in theoretical foundations, computational studies of a foundational nature are also welcome.

Topics

• Theoretical foundations of bio-inspired heuristics

• Exact and approximation runtime analysis

• Black box complexity

• Self-adaptation

• Population dynamics

• Fitness landscape and problem difficulty analysis
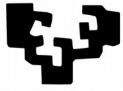
- No free lunch theorems

- Statistical approaches for understanding the behavior of bio-inspired heuristics

- Computational studies of a foundational nature

- combinatorial and continuous optimization

- single-objective and multi-objective optimization

- constraint handling

- dynamic and stochastic optimization

- co-evolution and evolutionary learning