

Valleys of Bad Performance in Discrete Optimization Problems

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Abstract

Three rather different case studies are discussed to demonstrate the phenomenon of “**Valleys of Bad Performance**”.

* C. Rose [4] analysed a majority approach for combinatorial optimization problems on n-dimensional Hamming cubes: Three good solutions are generated by local search. From them, a consensus solution is built, taking the majority componentwise. Starting from this consensus solution, another run of local search is performed. For large values of n the approach was (very) successful. However, **for intermediate dimensions n the results were worse** than those from an independent fourth run of local search.

* S. Kolassa [2], partly supported by S. Schwarz [3], analysed a two-step shortlisting procedure, which is performed by two independent non-perfect agents. Agent 1 reduces the original set of n candidates to a set of intermediate size k, and Agent 2 makes the final choice from this reduced list. It turns out that often there is an optimal intermediate size k^* , and between $k = 1$ and $k = k^*$ there is a **Valley of Bad Performance**.

* A. Irmer [1] is applying Monte Carlo methods in game tree search. When using nontrivial heuristics instead of completely random sampling, it can happen that **search with intermediate Monte Carlo parameters gives worse results** than search with Monte Carlo parameter = 0.

References

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