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From benchmarking optimization heuristics to dynamic algorithm configuration

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Stellingen
Behorende bij het proefschrift
From Benchmarking Optimization Heuristics
to Dynamic Algorithm Configuration

1. Algorithm behavior is more than just performance. For example: while all algorithms perform equally well on a truly random function, their search trajectories differ widely, showcasing potential biases in their design [Chapter 3]
2. Optimization algorithms are rarely proposed in isolation, but rather built based on existing methodologies. Employing modular design structures allows for more fair comparisons of new methodologies and for finding interactions between independently proposed algorithmic ideas. [Chapter 4]
3. Dynamically adjusting not only algorithm parameters but potentially the whole algorithm structure while solving an optimization problem has potential performance benefits over sticking with a fixed optimization algorithm the entire search. [Chapter 5]
4. The ways in which we currently judge automated algorithm selection methodologies are biased by the availability of benchmark suites, which are not necessarily designed with meta-learning in mind. [Chapter 6]
5. There is too much focus on developing ‘new’ optimization algorithms, and not enough on understanding their working principles.
6. Benchmarking is a critical aspect of algorithm design, and thus lowering the barrier to robust benchmark design is required to better understand the contributions of new algorithms.
7. Optimization is inherently suited to reproducible research practices and should take better advantage of this fact.
8. Goodhart’s Law states that “when a measure becomes a target, it ceases to be a good measure”. We should be careful not to fall into the same trap when using a fixed set of benchmark problems as our only source of comparison between algorithms.
9. Just because something can be optimized, doesn’t mean it should be.
10. It is the same in life as in algorithms: we should not be static in our beliefs, but adapt them when we collect new information.

Diederick Lambertus Vermetten,
Leiden, 13 February 2025