Optimizing solvers for real-world expensive black-box optimization with applications in vehicle design

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Stellingen

Behorende bij het proefschrift

Optimizing Solvers for Real-World Expensive Black-Box Optimization with Applications in Vehicle Design

1. Compared to Black-Box Optimization Benchmarking (BBOB) functions, real-world problems like automotive crashworthiness optimization belong to different optimization problem classes. (Chapter 3)
2. In contrast to the BBOB functions, test functions generated using a tree-based function generator exhibit optimization landscape characteristics that are more similar to real-world problems. (Chapter 4)
3. Based on some properly selected representative functions with similar optimization landscapes, the performance of optimization algorithms on unseen black-box optimization problems can be estimated. (Chapter 4)
4. Better performance can be achieved by utilizing optimization algorithms that are fine-tuned using representative functions, rather than relying on a general solver for solving real-world optimization problems with a limited function evaluation budget. (Chapter 5)
5. Existing benchmark suites should be expanded by including more diverse test functions to sufficiently cover real-world optimization problem classes.
6. Further improvements in current landscape analysis tools are necessary for real-world applications, such as using a smaller sample size and capturing discontinuities in optimization landscape.
7. In real-world applications, properly defining optimization problems can be as demanding and critical as efficiently solving them, requiring both domain knowledge and expertise.
8. Tremendous effort remains necessary to bridge the gap between the rapid advancement of optimization algorithms in academia and their practical applications in industry for solving real-world problems.
9. Optimization is never-ending – there is always room for improvement.

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Leiden, 27.11.2025