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Self-adjusting surrogate-assisted optimization techniques for expensive constrained black box problems

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Propositions
pertaining to the dissertation
**“Self-Adjusting Surrogate-Assisted Optimization Techniques
for Expensive Constrained Black Box Problems”**
by Samineh Bagheri

1. When parameter tuning is not affordable then adjusting the parameters during the optimization procedure as the algorithm learns about the problem is a reasonable alternative. *Chapter 3.*
2. In solving numerical optimization problems with equality constraints, reporting a Pareto optimal set of solutions (minimizing the objective function and infeasibility level) is more insightful than only one single solution with a level of infeasibility. *Chapter 4.*
3. EGO-based optimizers for constrained optimization problems are effective as long as the problem has a low dimensional parameter space and a limited number of active constraints. *Chapter 5, 6.*
4. Although RBF interpolation is not equipped with a model uncertainty measure, by means of analogy to Gaussian Processes, an uncertainty measure can be determined for any arbitrary RBF kernel including augmented cubic RBF. *Chapter 7.*
5. The uncertainty measure in Gaussian Process models is only a function of the point distribution in the input space.
6. Suitable algorithms for solving expensive real-world optimization problems are those which can explicitly or implicitly estimate the hidden structure of black box problems with as little information as possible.
7. Surrogate-assisted optimizers for constrained problems can benefit from utilizing different surrogate models for objective and constraint functions.
8. It is beneficial for surrogate-assisted optimizers to evaluate feasible and infeasible candidates in order to learn about the interesting region of the input space which is in the neighborhood of the feasibility borders in presence of active constraints.
9. There is no perfect model and the models should be evaluated based on the specific task they are aimed at, or as George Box says: “All models are wrong but some models are useful”.
10. Our life story is similar to a complex black box optimization process with phases of exploration, exploitation and decision making processes under uncertainty with conflicting objectives and constraints. Exploring the unknown uncomfortable paths will help us to have a better perception of life’s landscape.