Optimally weighted ensembles of surrogate models for sequential parameter optimization

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Propositions

belonging to the dissertation

"Optimally weighted ensembles of surrogate models for sequential parameter optimization"

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1. The choice or combination of surrogate models is essential for obtaining the best result in sequential model-based optimization. *(This thesis)*
2. In taxonomies of surrogate model frameworks, it is important to distinguish between single-evaluation model selection, multi-evaluation model selection and model combination. *(Chapter 3)*
3. The convex model combination works better than optimal model selection, both in ensemble methods used for function approximation and sequential optimization. *(Chapter 4 and 5)*
4. Even if the computational effort of training and model selection/combination is neglected, it leads to better results to update the model selection/combination not in every iteration but in larger time intervals. Furthermore, temporarily suspending weaker models enhances the performance of the ensemble. *(Chapter 5)*
5. In the case of non-uniform distributions of evaluated points, it leads to better results to use density weighted error measure used to assess the models' performance instead of uniformly weighted error measures. *(Chapter 5)*
6. The optimal choice of the best surrogate model depends on the evaluation method used for the assessment of the models' performance and on the context where the model is used, e.g., function approximation or optimization.
7. Considering different kinds of problems it does not always suffice to stick to a single surrogate model type. If different types of challenges are approached, also different types of surrogate models are required. *(Chapter 5)*
8. In sequential optimization, the merit of a surrogate model can depend on its numerical precision but also on its ability to rank solutions correctly or its ability to determine the optimal region.
9. When combining surrogate models, simple aggregation approaches usually perform better than complex aggregation approaches.
10. The burden of choosing the right surrogate model type does not have to be put on the user since surrogate-model selection/combination frameworks can automate this task.
11. A group of several experts always has the potential to perform better than a single expert if they work together and combine their insights.