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Bayesian Desirability Functions: An Organizing Principle for Multiple Response Optimization

Bayesian Optimization (BO) has received tremendous attention for optimizing deterministic functions and tuning ML parameters. There is increasing interest in applying BO to physical measurement data in industrial settings as a recommender system for product/process design. In this context multiple responses of interest are the norm, but "basic" BO is only defined minimization/maximization of a single response. In this presentation we introduce "Bayesian Desirability Functions" (BDFs), which simplify multiple response optimization back into a simpler single response optimization problem. We will demonstrate that BDFs are also a natural approach to matching response targets and batch augmentation of two or more runs.

Special/ Invited session

Classification

Both methodology and application

Keywords

Machine Learning, Design of Experiments, Gaussian Process

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