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LE RICHE Rodolphe
CNRS LIMOS at Mines Saint-Etienne

Abstract

Multi-objective Bayesian optimization with reference point

Bayesian algorithms (e.g., EGO, GPareto) are a popular approach to the mono and multi-objective optimization of costly functions. Despite the gains provided by the Gaussian models, convergence to the problem solutions remains out of reach when the number of variables and / or the number of objective functions increase.
In this presentation, we show how with Gaussian processes it is possible to restrict ambitions in order to recover problems that can be solved.

With strong restrictions on the number of objective function evaluations, it is often only feasible to target a specific point of the Pareto front. We describe the mEI criterion to do so. When no such point is known a priori, we propose to target the Pareto front center. Thus, we define this center, explain how to estimate it and how to detect convergence to it.
Once the center of the Pareto front has been found, we propose to enlarge the search for Pareto optimal solutions around it in a manner that is compatible with the remaining computational budget. To achieve this, virtual Bayesian optimizations are carried out on the Gaussian processes.
Finally, we discuss how to parallelize the resulting multi-objective Bayesian optimization algorithm.

This talk summarizes a joined work with David Gaudrie and Victor Picheny.