HGDL and gpCAM: Hybrid Local-Global and Modern Bayesian Optimization for Function Approximation, Uncertainty Quantification, and Decision-Making.

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Function Approximation and Optimization play an essential role in a vast array of scientific and industrial applications. In this talk, I aim to present and discuss two distinct approaches: a hybrid (local-global) optimizer that utilizes deflation to eliminate previously discovered optima, enabling subsequent local searches to disregard them, and modern approaches in Bayesian optimization (BO) and Gaussian process regression (GPR). Furthermore, we will explore how the hybrid optimizer can enhance BO and improve GPR's performance. GPR has recently gained new attention as an uncertainty-aware supervised machine-learning tool. I will present open-source algorithms and software to the audience, which are plug-and-play and can be used by practitioners for many problems out of the box.