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Global optimization based on noisy evaluations : An empirical study of two statistical approaches

Emmanuel Vazquez[1], Julien Villemonteix[1,2], Maryan Sidorkiewicz[2] and Éric Walter[3]

1. SUPELEC, 91192 Gif-sur-Yvette, France
2. RENAULT S.A., France
3. LABORATOIRE DES SIGNAUX ET SYSTÈMES, CNRS, SUPELEC, UNIV PARIS-SUD 91192 Gif-sur-Yvette, France

e-mail : emmanuel.vazquez@supelec.fr

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Abstract. The optimization of the output of complex computer codes has often to be achieved with a small budget of evaluations. Algorithms dedicated to such problems have been developed and compared, such as the Expected Improvement algorithm (EI) or the Informational Approach to Global Optimization (IAGO). However, the influence of noisy evaluation results on the outcome of these comparisons has often been neglected, despite its frequent appearance in industrial problems. In this paper, empirical convergence rates for EI and IAGO are compared when an additive noise corrupts the result of an evaluation. IAGO appears more efficient than EI and various modifications of EI designed to deal with noisy evaluations.

Keywords. Global optimization ; computer simulations ; kriging ; Gaussian process ; noisy evaluations.