



Bounding rare event probabilities in computer experiments

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We are interested in bounding probabilities of rare events in the context of computer experiments. These rare events depend on the output of a physical model with random input variables. Since the model is only known through an expensive black box function, standard efficient Monte Carlo methods designed for rare events cannot be used. We then propose a strategy to deal with this difficulty based on importance sampling methods. This proposal relies on Kriging metamodeling and is able to achieve sharp upper confidence bounds on the rare event probabilities. The variability due to the Kriging metamodeling step is properly taken into account. The proposed methodology is applied to a toy example and compared to more standard Bayesian bounds. Finally, a challenging real case study is analyzed. It consists of finding an upper bound of the probability that the trajectory of an airborne load will collide with the aircraft that has released it.

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