Abstract

Solving geometric optimization problems over uncertain data has become increasingly important in many applications and has attracted a lot of attentions in recent years. In this paper, we study two important geometric optimization problems, the k-center problem and the j-flat-center problem, over stochastic/uncertain data points in Euclidean spaces. For the stochastic k-center problem, we would like to find k points in a fixed dimensional Euclidean space, such that the expected value of the k-center objective is minimized. For the stochastic j-flat-center problem, we seek a j-flat (i.e., a j-dimensional affine subspace) such that the expected value of the maximum distance from any point to the j-flat is minimized. We consider both problems under two popular stochastic geometric models, the existential uncertainty model, where the existence of each point may be uncertain, and the locational uncertainty model, where the location of each point may be uncertain. We provide the first PTAS (Polynomial Time Approximation Scheme) for both problems under the two models. Our results generalize the previous results for stochastic minimum enclosing ball and stochastic enclosing cylinder.