

Title:

Computational complexity of average-case optimization: in search of new explanations

Abstract:

Our society lacks polynomial-time algorithms for solving many average-case optimization problems. Even in very simple data models, such as arrays with independent Normal entries, our best algorithms for solving natural optimization problems (e.g. sparse principal components analysis) require super-polynomial time. Is this information-computation gap inherent? In this talk, I will discuss the current limitations of computational complexity in answering these questions. I will show a new counterexample to the state of the art "overlap-gap" heuristic. Then I will suggest some alternatives, including a reduction to hypothesis testing with (unfortunate) ties to Ramsey theory.