

# Algorithms with Provable Guarantees for Clustering

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## Abstract

In this talk, we give an overview of the current best approximation algorithms for fundamental clustering problems, such as  $k$ -center,  $k$ -median,  $k$ -means, and facility location. We focus on recent progress and point out several important open problems.

For the uncapacitated versions, a variety of algorithmic methodologies, such as LP-rounding and primal-dual method, have been applied to a standard linear programming relaxation. This has given a uniform way of addressing these problems resulting in small constant approximation guarantees.

In spite of this impressive progress, it remains a challenging open problem to give tight guarantees. Moreover, this collection of powerful algorithmic techniques is not easily applicable to the capacitated setting. In fact, there is no simple strong convex relaxation known for the capacitated versions. As a result, our understanding of these problems is significantly weaker and several fundamental questions remain open.

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