Prize-Collecting Steiner Tree Problem (PCSTP)

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Abstract

In the early 19th century, Jakob Steiner wanted to figure out how to connect three villages using a system of roads of minimum length and this optimization problem was coined after him. Through the centuries, the NP-hard steiner tree problem has evolved and has been applied to different real-life cases. Since the problem is an intersection of graph theory, complexity theory and algorithms, it acts as a bridge between Computer Science and Mathematics. In this talk, we will introduce the problem, provide a distinction between steiner trees and minimum spanning trees and give an application through the prize-collecting steiner tree problem. We will use Ljubic et.al’s paper Solving the Prize-Collecting Steiner Tree Problem to Optimality, which models the laying of the fiber optic cable in Germany as a steiner tree problem.