

Hard Problems and Efficient Algorithms in Combinatorial Optimization

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Combinatorial Optimization is one of the youngest and most active areas of discrete mathematics. About 60 years ago, with the emergence of the first computers, Combinatorial Optimization became a subject in its own right. In an attempt to classify problems according to how efficiently they can be solved by computers, Combinatorial Optimization had great impact on Theoretical Computer Science and, in particular, Complexity Theory. Today we know that many interesting problems in Combinatorial Optimization are hard in the sense that, under widely believed complexity-theoretic assumptions, they cannot be solved efficiently. In this talk we first try to explain why certain problems in Combinatorial Optimization are more difficult to solve than others. We then discuss several popular approaches to solving hard problems algorithmically.