

Minimum Bounded Degree Spanning Trees

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Abstract

In this talk, I will consider the minimum spanning tree problem under the additional restriction that all degrees of the spanning tree must be at most a given value k . I will describe two approaches, one by myself and one by Mohit Singh and Lap Chi Lau. These results show that one can efficiently find a spanning tree of maximum degree at most $k+2$, or even at most $k+1$ for the second approach, whose cost is at most the cost of the optimum spanning tree of maximum degree k . This is best possible, as the problem of just deciding whether a graph has a spanning tree of maximum degree k is NP-complete.

The first approach uses a sequence of simple algebraic, polyhedral and combinatorial arguments, and relies on uncrossing, polyhedral characterizations, matroid intersection and graph orientation. The second approach also uses uncrossing and is a prime example of iterative relaxation, a new technique extending Jain's iterative rounding.