Two problems on (di)graphs

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Abstract

In this talk we cover two different topics, both of which are relevant to practical applications.

- **Min-Max edge-disjoint spanning trees:** Consider an edge-weighted graph G with weight function ω on the edges and such that G has two edge-disjoint spanning trees. The goal is to find a pair of spanning trees T_1, T_2 such that $\max\{\omega(T_1), \omega(T_2)\}$ is minimized. This problem contains the number partition problem as a (very) special case and hence is NP-hard. We describe a $\frac{3}{2}$-approximation algorithm for the problem which is based on a solution of the polynomially solvable problem (via an algorithm for matroid partition) of finding a pair of spanning trees T_1, T_2 such that $\omega(T_1) + \omega(T_2)$ is minimized. This is joint work with Daniel Goncalves, Lirmm, Montpeiller and Inge Gørtz, Technical Univeristy of Copenhagen.
- **Persistent digraphs:** This is more complicated to define so I will not do it here. It suffices to say that it concerns the structure of bounded subdigraphs of a digraph (the question is whether every such subdigraph is rigid, a property I will define in the talk). A digraph is **bounded** if no vertex has more than 2 out-neighbours. This problem comes from robotics and has to do with the stability a collection of autonomous agent systems. Among other things we will discuss the problem deciding whether a digraph is persistent and the problem of orienting a graph as a persistent digraph. This is joint work with Tibor Jordan, Eötvos University Budapest.

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