

Hardness of Vertex Disjoint Paths problem in some Digraph Classes

Saeed Akhoondian Amiri

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Given a graph and terminal pairs $(s_i; t_i); i \in [k]$, the *Vertex Disjoint Paths Problem (VDPP)* is to determine whether there exist s_i - t_i paths for $i \in [k]$, that do not share any vertex. This problem is fixed parameter tractable in undirected graphs, but it is NP-Complete in digraphs even if $k = 2$. In this talk I will present hardness results for the k -VDPP. We shall discuss the following topics:

1. It is NP-complete (Folklore).
2. It is NP-complete on tournaments (Folklore).
3. It is W[1]-complete on directed acyclic graphs [2].
4. It is NP-complete on upward planar graphs [1].

The main aim of this talk is to bring intuition behind hardness of VDPP on digraphs. At the end we will see some open questions in this area.

Literatur

- [1] Saeed Amiri, Ali Golshani, Stephan Kreutzer, and Sebastian Siebertz. Vertex disjoint paths in upward planar graphs. submitted, 2013.
- [2] Aleksandrs Slivkins. Parameterized tractability of edge-disjoint paths on directed acyclic graphs. In *European Symposium on Algorithms*, pages 482-493, 2003.