

Improved Algorithms for the 2-Vertex Disjoint Paths Problem

Torsten Tholey

Institut für Informatik
Universität Augsburg
D-86135 Augsburg, Germany
tholey@informatik.uni-augsburg.de

Abstract. Given distinct vertices s_1, s_2, t_1 , and t_2 the 2-vertex-disjoint paths problem consists in determining two vertex-disjoint paths p_1 , from s_1 to t_1 , and p_2 , from s_2 to t_2 , if such paths exist.

As a first result we show that by using some kind of sparsification technique the previously best known time bound of $O(n + m\alpha(m, n))$ can be reduced to $O(m + n\alpha(n, n))$, where α denotes the inverse of the Ackermann function. Moreover, we extend the very practical and simple algorithm of Hagerup for solving the 2-vertex-disjoint-paths problem on 3-connected planar graphs to a practical linear time algorithm for the 2-VDPP on general planar graphs thereby avoiding the computation of planar embeddings or triconnected components.