

A unified polynomial-time algorithm for Feedback Vertex Set on graphs of bounded mim-width

Lars Jaffke¹ O-joung Kwon² and Jan Arne Telle¹

1) *Department of Informatics, University of Bergen, Norway*

2) *Department of Mathematics, Incheon National University, Korea*

ABSTRACT

We give a first polynomial-time algorithm for (WEIGHTED) FEEDBACK VERTEX SET on graphs of bounded *maximum induced matching width* (mim-width). Explicitly, given a branch decomposition of mim-width w , we give an $n^{\mathcal{O}(w)}$ -time algorithm that solves FEEDBACK VERTEX SET. This provides a unified polynomial-time algorithm for many well-known classes, such as INTERVAL graphs, PERMUTATION graphs, and LEAF POWER graphs (given a leaf root), and furthermore, it gives the first polynomial-time algorithms for other classes of bounded mim-width, such as CIRCULAR PERMUTATION and CIRCULAR k -TRAPEZOID graphs for fixed k . We complement our result by showing that FEEDBACK VERTEX SET is $W[1]$ -hard when parameterized by w and the hardness holds even when a linear branch decomposition of mim-width w is given.