

Parameterized Algorithms for Directed Maximum Leaf Problems

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Abstract

We prove that finding a rooted subtree with at least k leaves in a digraph is a fixed parameter tractable problem. A similar result holds for finding rooted spanning trees with many leaves in digraphs from a wide family \mathcal{L} that includes all strong and acyclic digraphs. This settles completely an open question of Fellows and solves another one for digraphs in \mathcal{L} . We also prove the following combinatorial result which can be viewed as a generalization of many results for a ‘spanning tree with many leaves’ in the undirected case, and which is interesting on its own: If a digraph $D \in \mathcal{L}$ of order n with minimum in-degree at least 3 contains a rooted spanning tree, then D contains one with at least $(n/4)^{1/3} - 1$ leaves.