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On polynomial kernels for structural parameterizations of odd cycle transversal. (English)

Zbl 1352.68112

Summary: The Odd Cycle Transversal problem (OCT) asks whether a given graph can be made bipartite (i.e., 2-colorable) by deleting at most \( \ell \) vertices. We study structural parameterizations of OCT with respect to their polynomial kernelizability, i.e., whether instances can be efficiently reduced to a size polynomial in the chosen parameter. It is a major open problem in parameterized complexity whether Odd Cycle Transversal admits a polynomial kernel when parameterized by \( \ell \).

On the positive side, we show a polynomial kernel for OCT when parameterized by the vertex deletion distance to the class of bipartite graphs of treewidth at most \( w \) (for any constant \( w \)); this generalizes the parameter feedback vertex set number (i.e., the distance to a forest).

Complementing this, we exclude polynomial kernels for OCT parameterized by the distance to outerplanar graphs, conditioned on the assumption that \( \text{NP} \not\subseteq \text{coNP}/\text{poly} \). Thus the bipartiteness requirement for the treewidth \( w \) graphs is necessary. Further lower bounds are given for parameterization by distance from cluster and co-cluster graphs respectively, as well as for Weighted OCT parameterized by the vertex cover number (i.e., the distance from an independent set).

For the entire collection see [Zbl 1238.68016].

MSC:

- 68Q25 Analysis of algorithms and problem complexity
- 05C38 Paths and cycles
- 05C85 Graph algorithms (graph-theoretic aspects)
- 68Q17 Computational difficulty of problems (lower bounds, completeness, difficulty of approximation, etc.)

Full Text: DOI

References:


