Clique-Width: Harnessing the Power of Atoms

Konrad K. Dabrowski

University of Leeds

`k.k.dabrowski@leeds.ac.uk`

Tomáš Masařík

Simon Fraser University

`masarik@kam.mff.cuni.cz`

Jana Novotná

University of Warsaw

`janca@kam.mff.cuni.cz`

Daniël Paulusma

Durham University

`daniel.paulusma@durham.ac.uk`

Paweł Rzazewski

Warsaw University of Technology

`p.rzazewski@mini.pw.edu.pl`

Many NP-complete graph problems are polynomial-time solvable on graph classes of bounded clique-width. Several of these problems are polynomial-time solvable on a hereditary graph class $\mathcal{G}$ if they are so on the atoms (graphs with no clique cut-set) of $\mathcal{G}$. Hence, we initiate a systematic study into boundedness of clique-width of atoms of hereditary graph classes. A graph G is *H-free* if H is not an induced subgraph of G, and it is (H_1, H_2)-*free* if it is both H_1-free and H_2-free. A class of H-free graphs has bounded clique-width if and only if its atoms have this property. This is no longer true for (H_1, H_2)-free graphs, as evidenced by one known example. We prove the existence of another such pair (H_1, H_2) and classify the boundedness of clique-width on (H_1, H_2)-free atoms for all but 18 cases.

References

[1] Konrad K. Dabrowski, Tomáš Masařík, Jana Novotná, Daniël Paulusma, and Paweł Rzazewski. Clique-width: Harnessing the power of atoms. *Proc. WG 2020, LNCS*, 12301:119–133, 2020. Full version: arXiv:2006.03578.