

Treewidth Bounds for Planar Graphs

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We develop a new technique for obtaining upper and lower bounds on the treewidth of a planar graph. Building on techniques of Bodlaender, Grigoriev and Koster, our algorithm simultaneously searches a planar graph for an obstruction to treewidth and creates a tree decomposition of the graph in $O(|G|^3)$ -time. Unlike previous techniques that rely on finding a large square grid minor, our algorithm searches for a more general highly connected structure, which we call a *net* in the graph. The upper and lower bounds on treewidth returned by the algorithm are both at most a constant factor away from optimum. Moreover, these bounds improve the upper and lower bounds given by Bodlaender et al.

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