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Small universal point sets for $k$-outerplanar graphs. (English) Zbl 1398.05068

Summary: A point set $S \subseteq \mathbb{R}^2$ is universal for a class $G$ of planar graphs if every graph of $G$ has a planar straight-line embedding on $S$. It is well-known that the integer grid is a quadratic-size universal point set for planar graphs, while the existence of a subquadratic universal point set still remains one of the most fascinating open problems in graph drawing. In this paper we make a major step towards a solution for this problem. Motivated by the fact that each point set of size $n$ in general position is universal for the class of $n$-vertex outerplanar graphs, we concentrate our attention on $k$-outerplanar graphs. We prove that they admit an $O(n \log n)$-size universal point set in two distinct cases, namely when $k = 2$ (2-outerplanar graphs) and when $k$ is unbounded but each outerplanarity level is restricted to be a simple cycle (simply-nested graphs).

MSC: 05C10 Planar graphs; geometric and topological aspects of graph theory

Keywords: universal point sets; planar graphs; $k$-outerplanarity

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References:

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