

Simultaneous Embedding with Two Bends per Edge in Polynomial Area

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Abstract. The simultaneous embedding problem is, given two planar graphs $G_1 = (V, E_1)$ and $G_2 = (V, E_2)$, to find planar embeddings $\varphi(G_1)$ and $\varphi(G_2)$ such that each vertex $v \in V$ is mapped to the same point in $\varphi(G_1)$ and in $\varphi(G_2)$. This article presents a linear-time algorithm for the simultaneous embedding problem such that edges are drawn as polygonal chains with at most two bends and all vertices and all bends of the edges are placed on a grid of polynomial size. An extension of this problem with so-called fixed edges is also considered.

A further linear-time algorithm of this article solves the following problem: Given a planar graph G and a set of distinct points, find a planar embedding for G that maps each vertex to one of the given points. The solution presented also uses at most two bends per edge and a grid whose size is polynomial in the size of the grid that includes all given points. An example shows two bends per edge to be optimal.