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Aichholzer, Oswin; **Cetina, Mario**; **Fabila-Monroy, Ruy**; **Leaños, Jesús**; **Salazar, Gelasio**; **Urrutia, Jorge**

Convexifying monotone polygons while maintaining internal visibility. (English)

Zbl 1375.68118

Márquez, Alberto (ed.) et al., Computational geometry. XIV Spanish meeting on computational geometry, EGC 2011, dedicated to Ferran Hurtado on the occasion of his 60th birthday, Alcalá de Henares, Spain, June 27–30, 2011. Revised selected papers. Berlin: Springer (ISBN 978-3-642-34190-8/pbk). Lecture Notes in Computer Science 7579, 98-108 (2012).

Summary: Let P be a simple polygon on the plane. Two vertices of P are visible if the open line segment joining them is contained in the interior of P. In this paper we study the following questions posed in [*E. D. Demaine* and *J. O'Rourke*, "Open problems from CCCG 2008", in: Proceedings of the 21st Canadian conference on computational geometry, CCCG'09. Vancouver: University of British Columbia. 75–78 (2009), `http://cccg.ca/proceedings/2009/cccg09_20.pdf`; *S. L. Devadoss* et al., "Visibility graphs and deformations of associahedra", Preprint, `arXiv:0903.2848`]: (1) Is it true that every non-convex simple polygon has a vertex that can be continuously moved such that during the process no vertex-vertex visibility is lost and some vertex-vertex visibility is gained? (2) Can every simple polygon be convexified by continuously moving only one vertex at a time without losing any internal vertex-vertex visibility during the process?

We provide a counterexample to (1). We note that our counterexample uses a monotone polygon. We also show that question (2) has a positive answer for monotone polygons.

For the entire collection see [Zbl 1253.68016].

MSC:

`68U05` Computer graphics; computational geometry (digital and algorithmic aspects)

`52B55` Computational aspects related to convexity

Cited in **1** Document

Keywords:

convexification; monotone polygons; visibility graph

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