Horizon trees versus pseudo-triangulations

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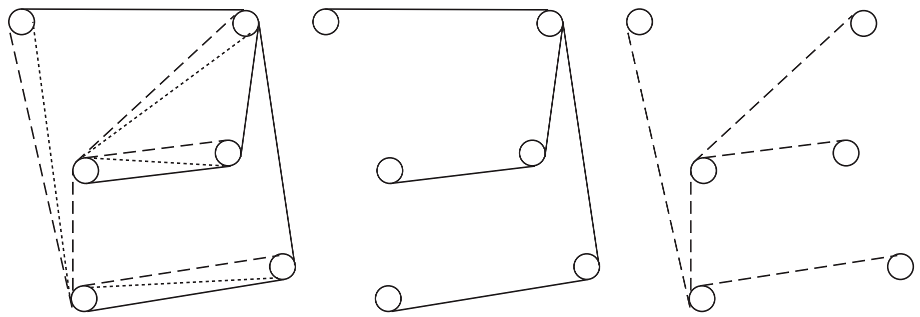

In their seminal paper 'Topologically Sweeping an Arrangement' [2] Edelsbrunner and Guibas designed an optimal time and linear (working) space algorithm to sweep an arrangement of lines in the plane by a 'topological line'. They introduced the so-called *horizon trees* in order to discover where in a *cut* an elementary step can be applied. This tricky notion of horizon trees has been reused by Asano, Guibas and Tokuyama [1] to design an efficient algorithm — the 'Topological Walk Method' — to sweep the region of an arrangement of lines bounded by a convex polygon, and more recently by Rivière [4] to design an optimal time and linear space output sensitive algorithm to compute the visibility graph of a collection of line segments. In this talk I will show that the 'Greedy Flip Algorithm' of Vegter and myself [3] — an algorithm to compute the tangent visibility graph of a collection of convex sets in the plane — can be used as an alternative to the three previous mentioned algorithms, and I will relate, in a precise sense, the notion horizon trees to the notion of *greedy pseudo-triangulations*.

References

[1] Te. Asano, L. J. Guibas, and T. Tokuyama. Walking on an arrangement topologically. *Internat. J. Comput. Geom. Appl.*, 4:123–151, 1994.

[2] H. Edelsbrunner and L. J. Guibas. Topologically sweeping an arrangement. *J. Comput. Syst. Sci.*, 38:165–194, 1989. Corrigendum in 42 (1991), 249–251.

[3] M. Pocchiola and G. Vegter. Topologically sweeping visibility complexes via pseudo-triangulations. *Discrete Comput. Geom.*, 16:419–453, December 1996.

[4] S. Rivière. *Calculs de visibilité dans un environnement 2D.* PhD thesis, University Joseph Fourier – Grenoble I, January 1997. To appear.

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