

On High Connectivity Triangulation of Planar Point Sets

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Abstract

In this lecture, we consider the problem of determining in polynomial time whether a given planar point set P of n points in general position admits a $4 - \text{connected}$ triangulation. We present a necessary and sufficient condition for recognizing such point sets P , and design an $O(n^3)$ time algorithm for constructing a $4 - \text{connected}$ triangulation of P , if it exists. Thus, our algorithm solved a longstanding open problem in computational geometry and geometric graph theory.

We also provide a simple $O(n^2)$ time method for constructing a non-complex triangulation of P , if it exists. This method provides a new insight into the structure of 4 – *connected* triangulations of point sets.

1. J.-P. Laumond, *Connectivity of plane triangulations*, Information Processing Letters, 34:87-96, 1990.
2. T. K. Dey, M. B. Dillencourt, S. K. Ghosh and J. M. Cahil, *Triangulating with high connectivity*, Computational Geometry: Theory and Applications, 8: 39-56, 1997.
3. A. A. Diwan, S. K. Ghosh and B. Roy, *Four-connected triangulation of planar point sets*, Discrete and Computational Geometry, 53: 713-746, 2015.