The Continuous-Graph Approach to Visibility Problems*

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In this talk, we investigate visibility problems under the unifying framework of a continuous graph known as the *point-visibility graph.* The point-visibility graph of of a polygon P, denoted $PVG(P)$, is the graph of the visibility relation on P; i.e., $PVG(P) = (V, E)$ where

$$\begin{aligned} V &= \{x \mid x \epsilon P\}, and \\ E &= \{(x, y) \mid \overline{xy} \subset P\}. \end{aligned}$$

Many computational geometry problems concerned with visibility turn out to be graph-theoretic problems on point-visibility graphs. On the other hand, interesting graph-theoretic problems on point-visibility graphs are often interesting geometric problems on polygons.

In the first portion of the talk, we will discuss using point-visibility graphs as an underlying framework for visibility investigations. In the second portion of the talk, we will concern ourselves with two particular interesting properties of graphs: perfection and isomorphism. We call a polygon *perfect* if its point-visibility graph is perfect. We call two polygons *isomorphic* if their point-visibility graphs are isomorphic; i.e., there is a one-to-one mapping between their *points* (not vertices) that preserves visibility. We show that spiral polygons are perfect, and that they admit a polynomial-time isomorphism algorithm. We also discuss related polygon classes.

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