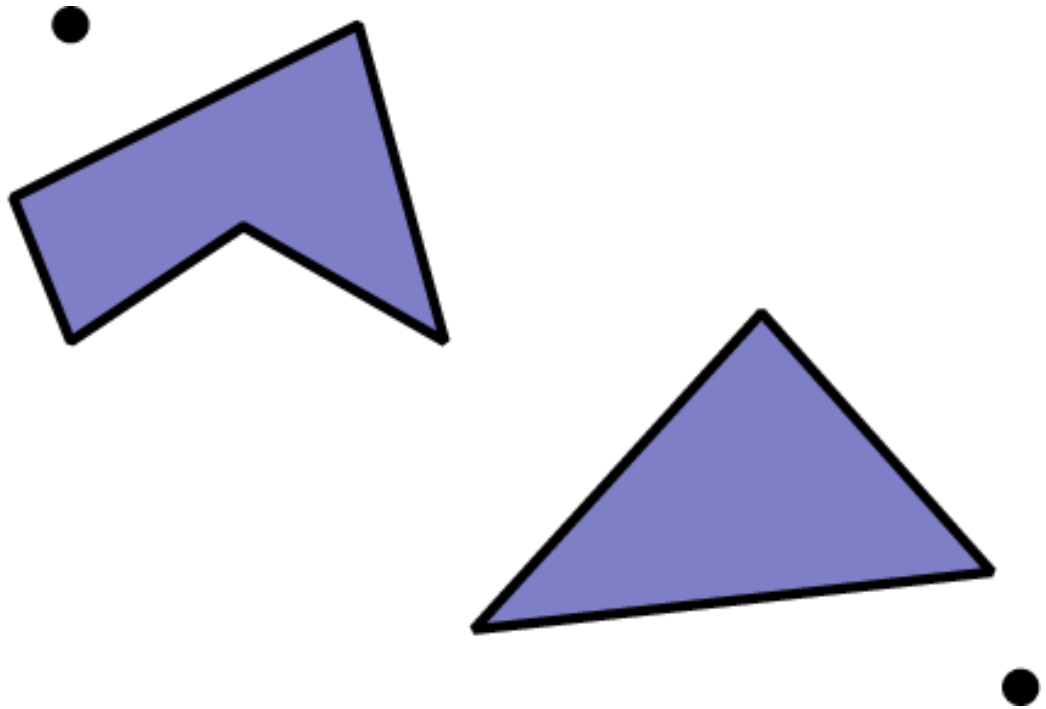
Navigation: Visibility graphs

Introduction and algorithm

Introduction

A **visibility graph** can be used to compute shortest paths among known polygonal planar obstacles.



Problem

Given:

- A set of **obstacles** represented as **polygons**.
- A non-obstacle **starting state** x_I.
- A non-obstacle **ending state** x_G.

Compute:

- The **shortest path** between x_I and x_G that avoids the obstacles.

Visibility graph definition

Definition

The **visibility graph** is a weighted graph that includes all paths consisting of line segments between obstacle vertices, the start, or the goal.

Nodes:

- One node for each polygon vertex.
- Two extra nodes for x_I and x_G.

Visibility graph definition

Definition

The **visibility graph** is a weighted graph that includes all paths consisting of line segments between obstacle vertices, the start, or the goal.

Edges:

- Between each pair of nodes that can be connected with an obstacle-free segment.
- Weights equal to the distance between nodes.