Intro to Comp Geom

What is Comp G
- a subfied of algoriths
  w/ geometric I/O ——— focus of course
- often look at 2D & 3D problems
  (usually lower <10 dim)
  (usally approx in higher dim)
  Comp G developed by researchers discrete algos:
  - emphasis on combinatorics and topology
  - primarily focus on "flat objects"

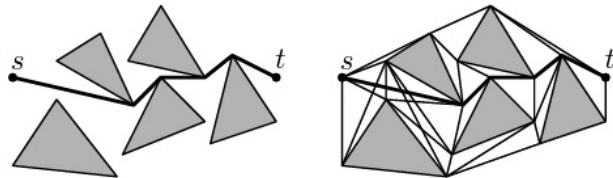Applications;
  - graphics
  - image processing
  - CAD
  - GIS
  - application in sciene (bio, fluid dynamics, physics)

Typical problem

Given: a set of polygonal obsticales
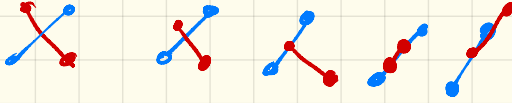   a start point
       a goal point
find: shortest
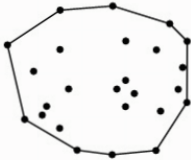path from
start (s)
to the goal (t)

Strengths of Comp G
- tools of CompG: provably correct and efficient algs
- emphasis on provability & efficiency:
- emphasis on correctness & robustness
  ex do 2 segs intersect

Limitations
- emphasis on discrete: can't use for cts problems that do not have a discretization
- emphasis on flat objects

Topics

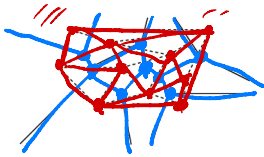
Convex hull   Polygon triangulation
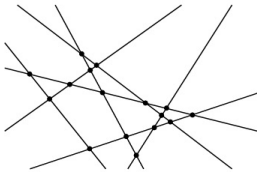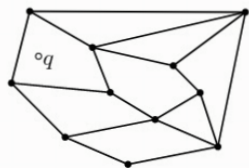

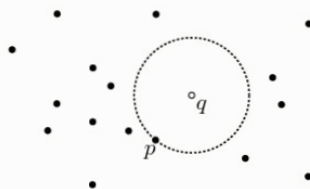Fig. 3: Voronoi diagram and Delaunay triangulation.

Fig. 4: An arrangement of lines in the plane.

$$ax + by + c = 0$$
$$\rightarrow (a, b, c)$$

$\nearrow$ in $\mathbb{R}^2$

- in $\mathbb{R}^3$
- homogeneous
  p=min in 2D

point location

nearest neighbor searhcing