

Voronoi Diagram Based Roadmap Motion Planning

CS365 Project

By:

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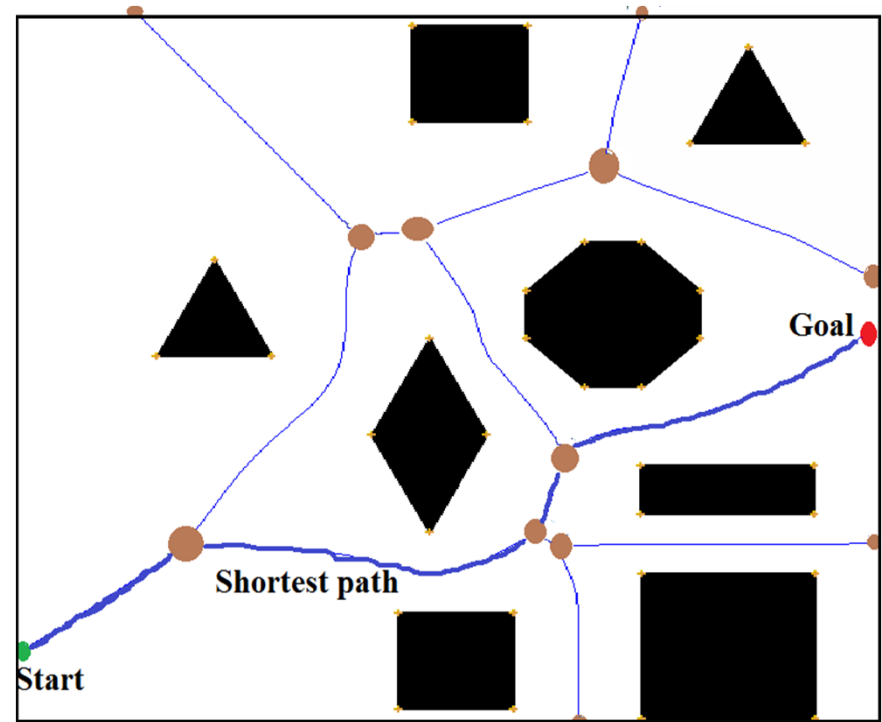
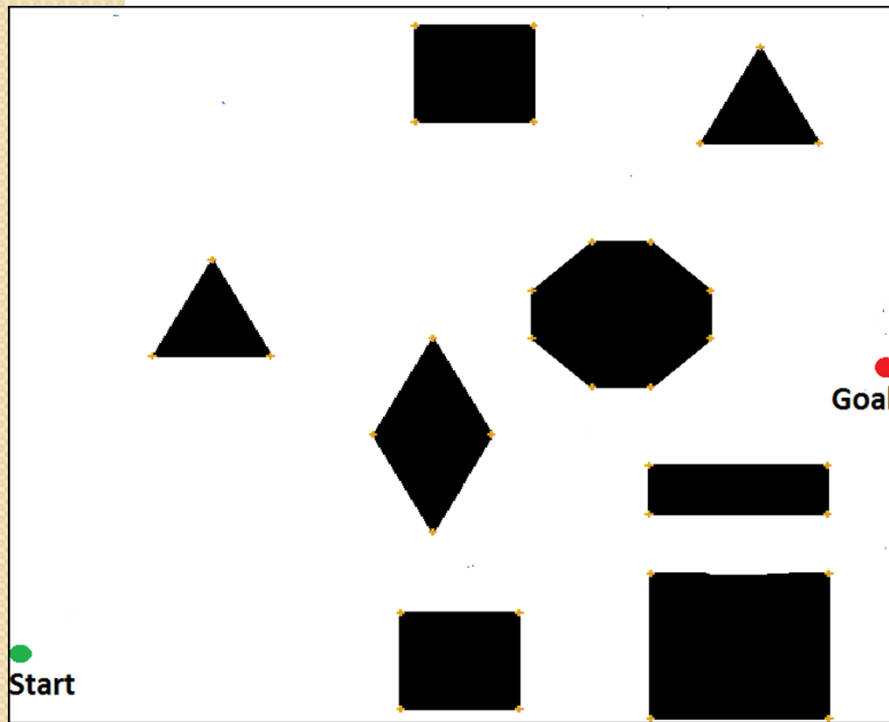
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Introduction

- Goal is to compute shortest **Collision Free** path



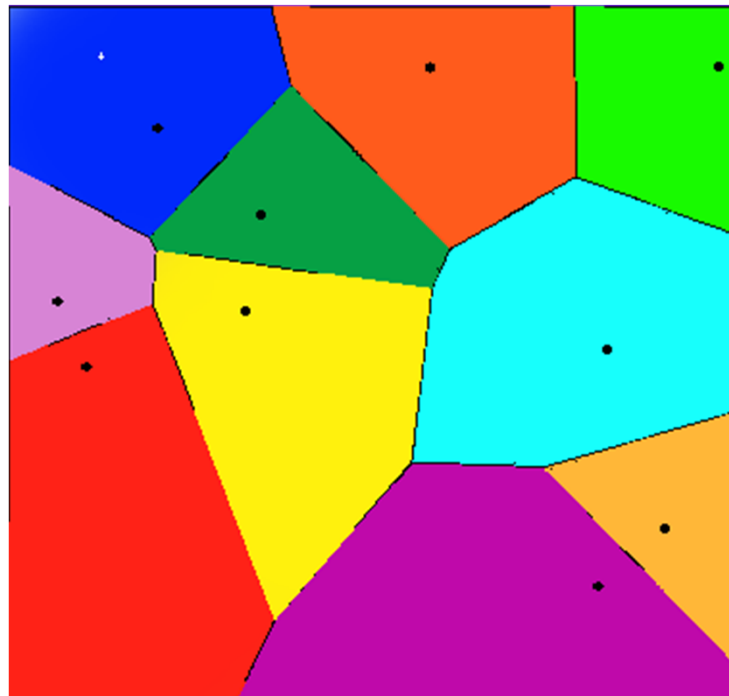


Task Division

- Drawing Voronoi Diagram
- Retraction Distance

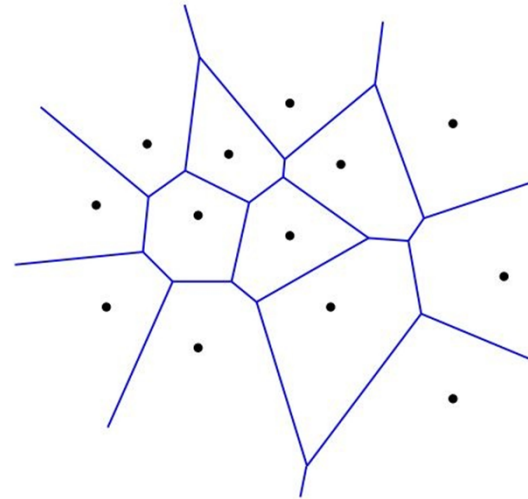
What is Voronoi Diagram?

- A Voronoi diagram of a **set of sites** in the plane is a collection of regions that divide up the plane.
- Each region corresponds to one of the sites.



Drawing Voronoi Diagram:

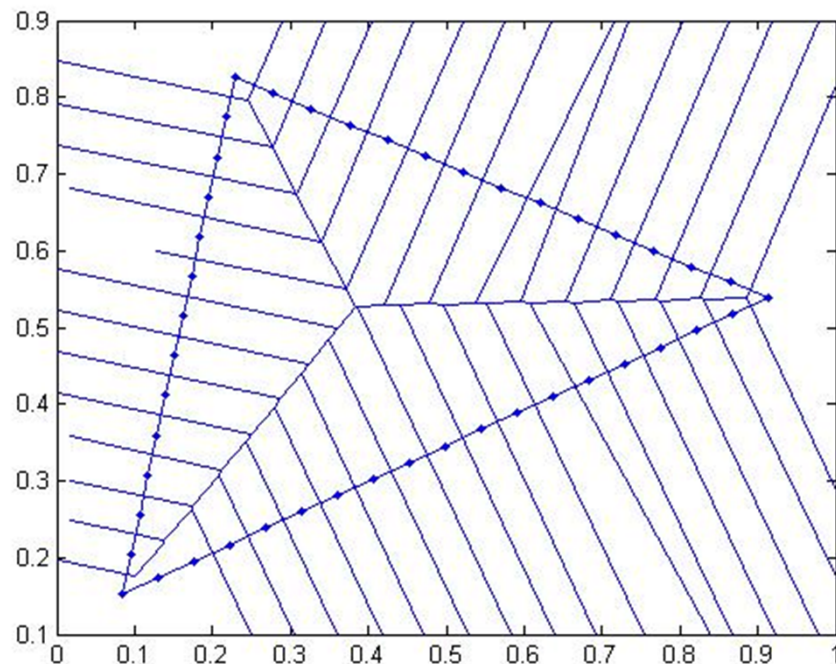
- Point Obstacles



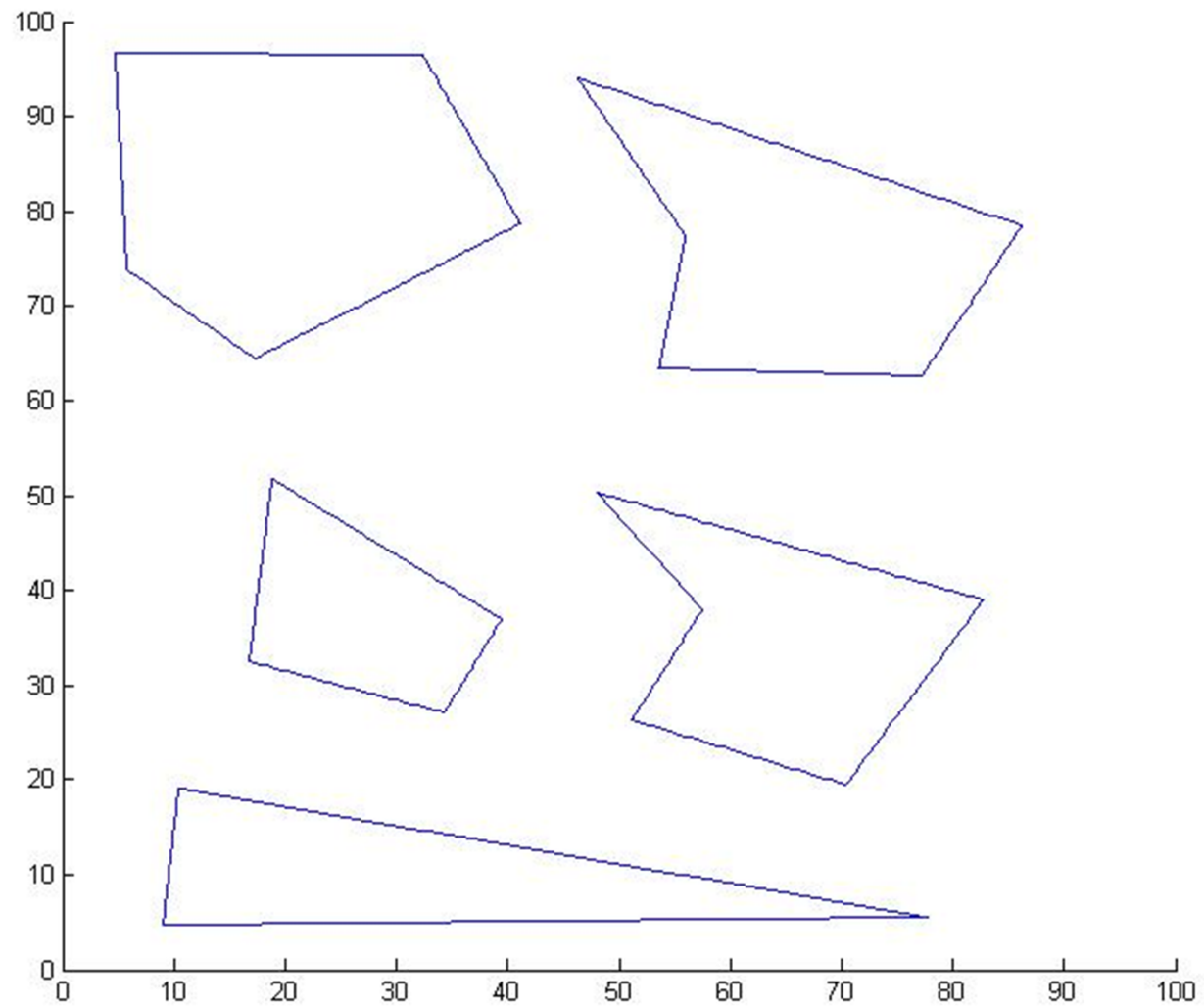
- Line obstacle can be viewed as set of point obstacles.

Drawing Voronoi Diagram...

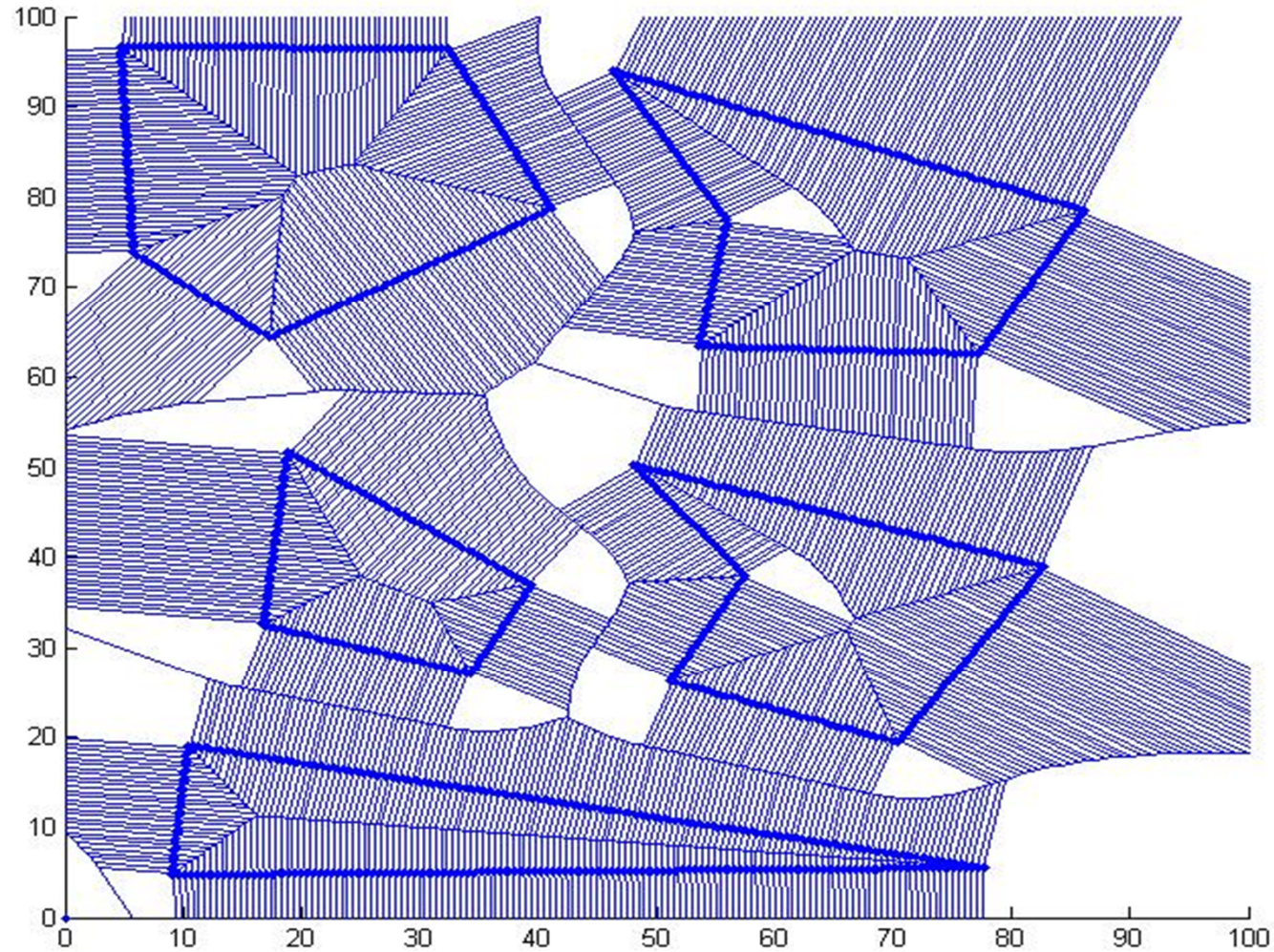
- Polygonal Obstacles
 - Can be viewed as set of line obstacles
 - Each line obstacle can be viewed as set of point obstacles separated by distance of ϵ



Drawing Voronoi Diagram...

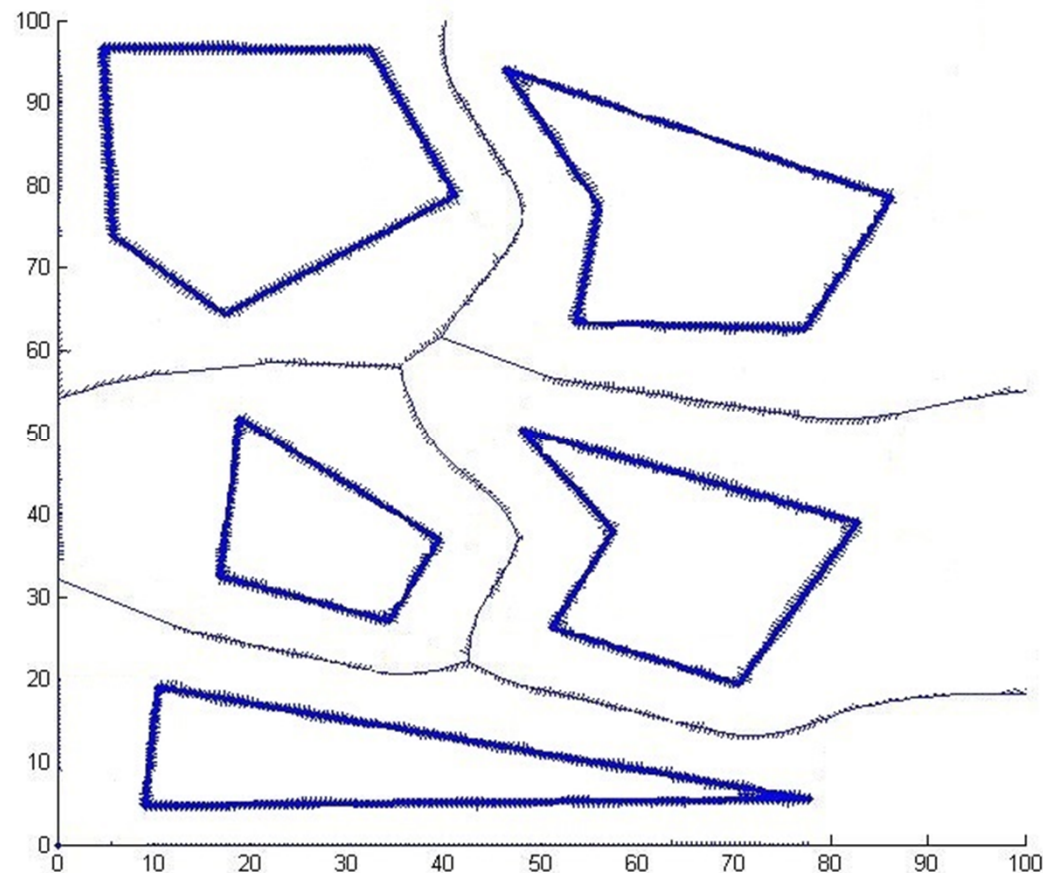


Drawing Voronoi Diagram...



Drawing Voronoi Diagram...

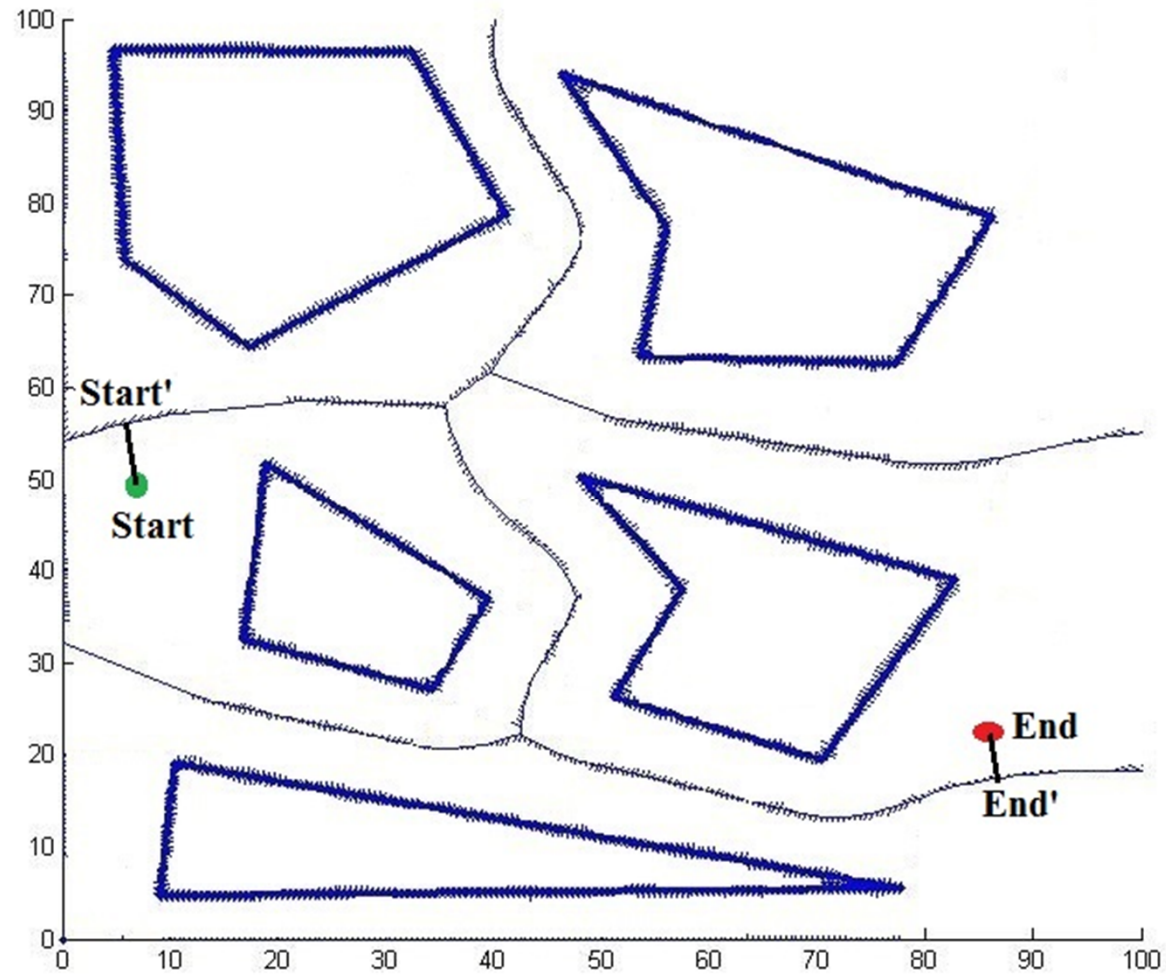
- Consider Voronoi edges that are generated by vertices of different obstacles.



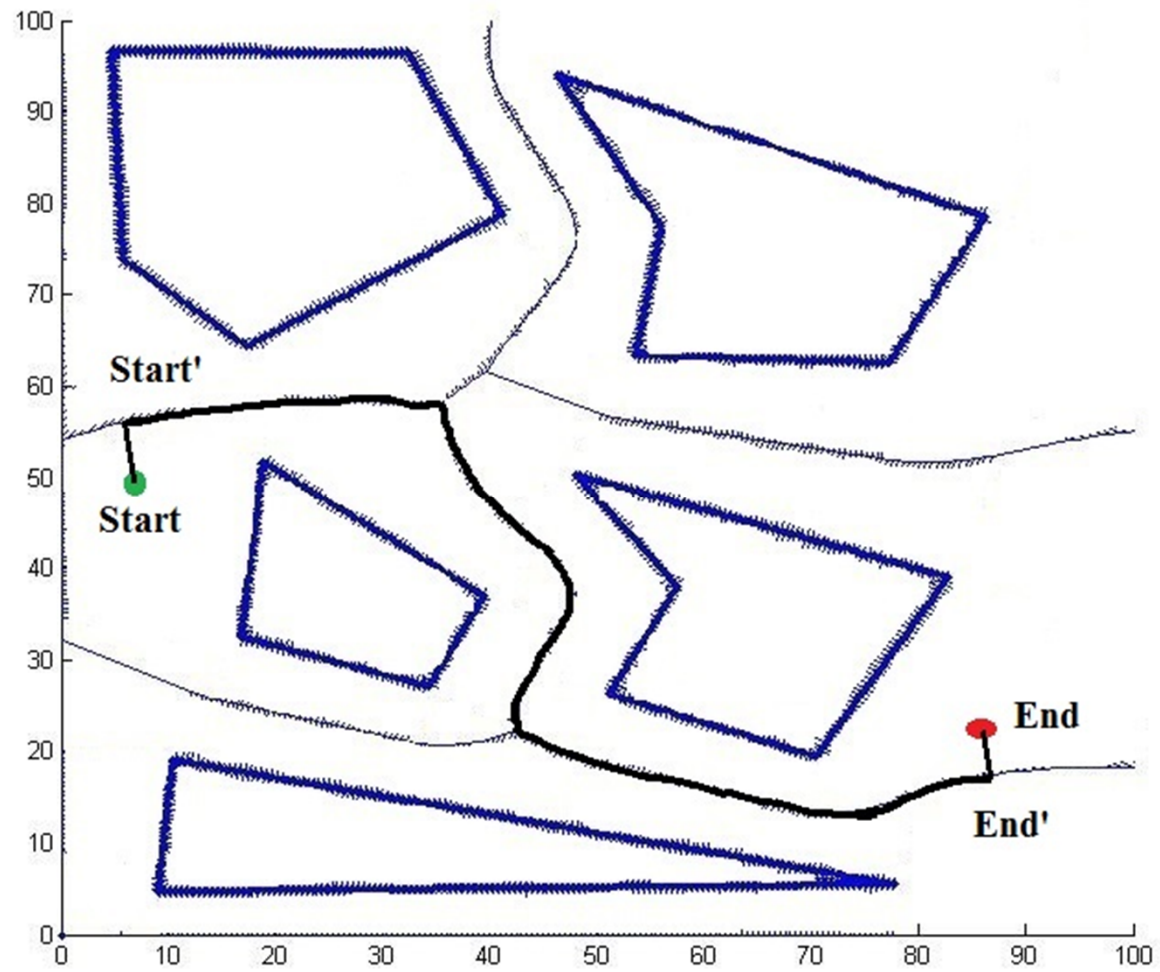
Retraction

- **Start** and **End** are not necessary to lie on Voronoi Diagram
- From **Start** to Voronoi Diagram **Start'**
 - Identify the **cell** of Start
 - Path to **nearest edge** – Perpendicular from Start to the edge
- From **End'** to **End**
 - Similar to Start
- Finding shortest path from Start' to End' using Graph search

Retraction...



Retraction...



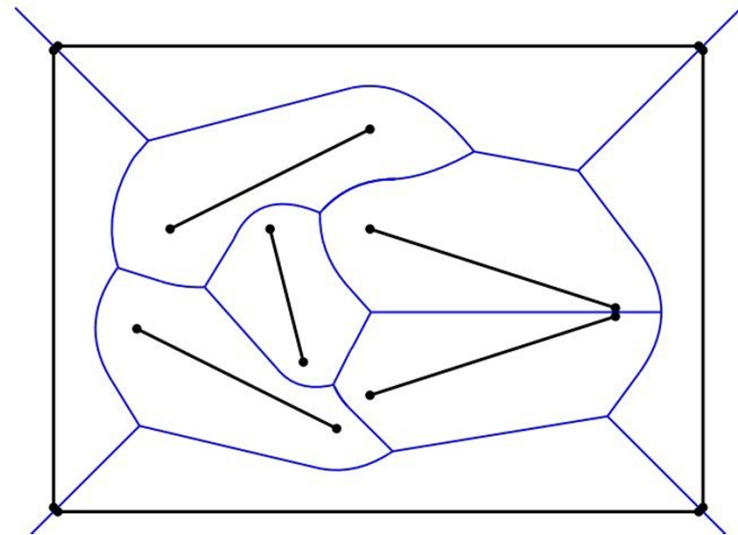
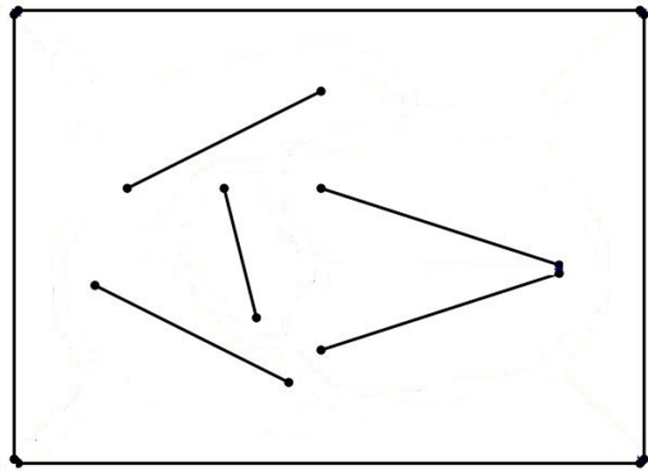


THANK YOU!

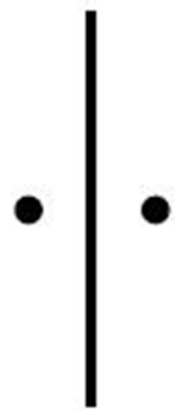
QUESTIONS ??

- Line Obstacles

- Draw voronoi diagram for point obstacles and consider those edges



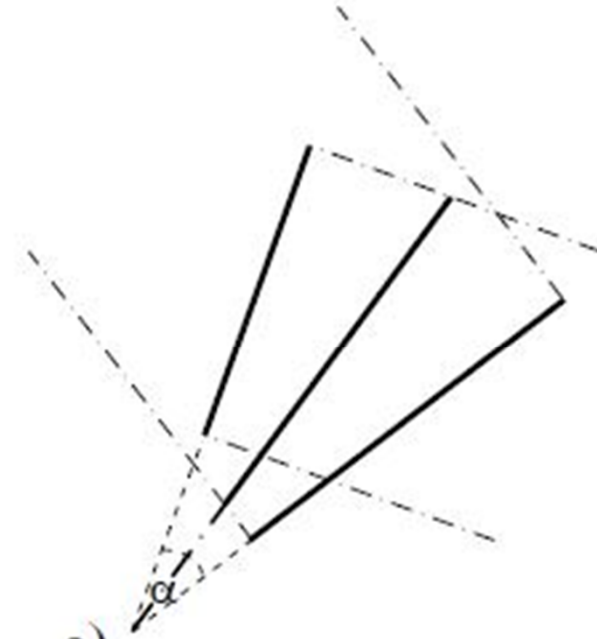
Voronoi Edges for different configurations



a)



b)



c)