



Lecture 8-2: Map Making

Objectives:

- Describe decomposition strategies for map making
- Describe the two types of formal exploration strategies the difference between iconic and feature-based localization

There are several decomposition strategies to approximate the robot’s real world environment including

- Representing the environment lines as a set of infinite lines
- Abstraction by selecting certain environmental features

The disadvantage of both of these techniques is a loss of fidelity between the map and the real world.

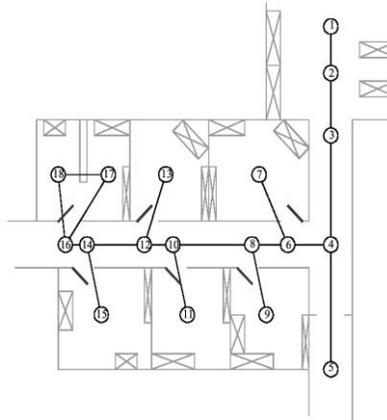
<p>separates the world into trapezoids for the free space and represents obstacles as polygons, the map representation is minimized</p>	
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<p>the world is tessellated into a discrete approximation of a continuous map, the disadvantage is that it is inexact in nature, narrow passages are lost in this transformation</p>	
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_____ uses a counter to determine how many times a cell is hit by a ranging sensor and the darkness of the cell relates to the proportionality of it being deemed an obstacle.



_____ avoids direct measurement of geometric environment qualities and concentrates on characteristics relevant to robot localization. The world is represented by nodes and connectivity arcs and adjacent pairs of nodes are at the heart of the topological approach.



_____ is the ability of a robot to explore an environment, build an appropriate map and then localize itself relative to this map. This is one of the most difficult problems specific to mobile robot systems. This is because it is based upon the interaction between the position updates it uses to localize and the mapping actions.

The _____ problem is the confusion of multiple places that look similar and therefore ambiguous. How do you associate the sensed data with the absolute ground truth?

Exploration attempts to answer the question, _____?

Two basic exploration methods are:

- _____
- _____

Frontier-based exploration is when a robot enters a new area and divides the space into areas that have been sensed and are open and those that have not been sensed, these boundary lines are called **frontiers**.



_____ is when the robot decides how to explore a space by building a reduced generalized Voronoi graph. The robot attempts to maintain a path that places it equidistant from all objects that it senses.

