

UNIVERSITY OF CALIFORNIA, LOS ANGELES



Models and Methods for Sensor-Based Environment Exploration

Supervisor

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Overview

How to endow a robot with a “sense” of the surrounding environment?

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Localization To interact with the environment, I need to know where I am, relative to where I have been and what I have seen.

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Exploration Once I know the objects around me, I can expand my region of understanding.

Representation As that region grows, I must compress my understanding to fit my mind.

Outline of the Talk

1. Overview

1.1 Observability of Visual-Inertial Navigation

1.2 Scene Segmentation by Aggregation of Global Ordering Constraints

1.3 Designing Agents with Task-Specific Minimal Representation

2. Featured Chapter: Information-Driven Autonomous Exploration

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Outline for section 2

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Here, the explorer knows that there are four identical boxes scattered within a room of known dimensions, three of which he can see. Based on allowable configurations of the missing block (blocks can not intersect, unseen blocks can not lie in known free space), the explorer can compute, at each point in the shadow region, the probability that that point is covered by an obstacle.

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