Robot Learning in Real Environments

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September 2016

1 Abstract

When a robot does navigation it creates a map of the scene. This map is then updated as the robot travels through the scene.

In this thesis we are interested in enriching the map with further information collected by the robot as it navigates the scene: it can record that a certain person is usually at a given room, so when it enters the room it can search for that person and update the probability of finding the person in that room.

The idea is to have a robot keeping a record of the probabilities of events in it's "world". This helps it interact with the world and can allow it to answer questions such as: "Where is Mary?" with "Mary is usually in room X".

2 Goals

The main goal of this thesis is to create a ROS [1] node that records the probability of events that the robot notices as it goes around in it's "world".

The student will use a Turtlebot 2 robot that is available at SOCIA lab for the real world experiments.

The information from the world is captured by the robot's sensors and we are particularly interested in using visual information from a Kinect camera.

The robot already has nodes for navigation and object detection and recognition (among others) that can be leveraged for the goal of this thesis.

3 Tasks

T1: State-of-the-art in knowledge representation.

T2: Implement a node to record the probabilities of events.

T3: Make extensive evaluation on real world scenarios.

T4: Write the thesis and a scientific paper.

4 Schedule

Task	Start date	Duration
T1	2016-10-01	2 months
T2	2016-12-01	3 months
T4	2017-03-01	1 month
T5	2017-04-01	3 months

References

[1] Morgan Quigley, Ken Conley, Brian Gerkey, Josh Faust, Tully B. Foote, Jeremy Leibs, Rob Wheeler, and Andrew Y. Ng. ROS: an open-source robot operating system. In *ICRA Workshop on Open Source Software*, 2009.