Problem Set #4
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Dustin Tran, Xiaomin Wang, Rodrigo Gomes
{trandv,xiaominw, rgomes}@mit.edu

Task: Robot grocery shopping

1 Motivation

Imagine that you're in your bed, hungry, and you just don't want to walk all the way to the grocery store. Equivalently, imagine you're working, doing the most exciting task to save humanity, and you have no time to grab food—menial tasks are beyond you. We'd like a robot which can intelligently learn to shop groceries for us: it understands a query from the user, moves to the grocery store, finds the relevant (and cheapest) items, purchases it, and comes back to the user.

In our project we focus on the arguably most difficult of these tasks, which is to locate the groceries in the store. Moreover, we work under the realistic scenario in which the robot can only observe its surroundings (POMDP) rather than an understanding of where it precisely is in the store (MDP).

Given this partially observable setting, the robot should learn how to obtain all items in the grocery store and do so in an optimal amount of time. It must learn: 1. how to navigate around the store without bumping into walls or aisles; 2. intelligently search for the items by learning which aisle corresponds to which category; and 3. find the optimal path and sequence to obtain all items.

2 Procedure

3 Experiments