Turtlebot Food Delivery System

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Project Group 20

Problem Statement

Consider a food delivery system where an agent is trying to reach all the destinations. Each destination has its own time interval constraint within which the food has to be delivered. The agent has to come up with a plan to meet all the constraints and deliver food with the minimum distance travelled.

Motivation

With the rapid increase in the usage of food delivery services, it is increasingly critical for companies to plan their deliveries and find optimal paths. These services have to deliver within the time constraints or they could lose their customers to a different service which can promise faster delivery times. As these services depend primarily on vehicles, finding optimal paths could help companies gain more customers and reduce operation costs.

Approach

To simulate this problem, we will be using the Gazebo environment with 10 - 20 goal states, each having its own time interval constraints. We are thinking to formulate this as a Constraint Satisfaction problem. We will be designing an algorithm which takes the starting state and goal states, along with the time constraints as input. The algorithm will output the optimal plan to visit each goal node satisficing the time constraints.

Task Assignment

Member Name	**Tasks associated**
Apoorv Tomar	Literature survey on the state of the art techniques
Apoorv Tomar	Design and Implementation of algorithm, Testing with different scenarios
Vijai Kumar Harihar	Modelling the constraints of the problem and ensuring the correctness and soundness of the solution.
Vijai Kumar Harihar	Design and implement the algorithm and test different cases
Rohit Vaddi	Designing and Implementing the gazebo environment for different grid sizes
Rohit Vaddi	Implementing the helper functions and the server for the turtlebot
Rounak Sengupta	Implementing the algorithms taught in the classroom to see if they work with the problem statement.
Rounak Sengupta	Performing a comparative study with the new techniques found by doing literature survey.

Changes

Based on the feedback we received, we have abandoned the original approach of generating the agent's plan using CSPs. We are now using A* (A-star) algorithm to generate our plan, and the optimal path. Also, to simulate this problem, we will be using the Gazebo environment with given "h" houses each having randomly generated time constraints.