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General Solution To Find Objects

D4, D5, D6 Final Demonstration

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Contents

Project Goal

- Find the user specified object.
- Use ontology to obtain the possible locations of the object.
- Navigate through possible locations.
- Perceive the scene and find the object.
- If object is not found move to next location and look for the object.

Figure 1: Toyota HSR robot

Figure 2: Detected objects

Mid-term Deliverable

- Updated ontology to return all the natural locations relative to the specified item.
- Mapped home lab and created natural locations and surfaces where the objects can found.
- Integrated navigation to find object package and the robot moves to all possible locations when an object name is given.

Approach Used

- Implemented a general strategy to find a user-specified object
  - Obtain the Possible locations of the user-specified object based on ontology.

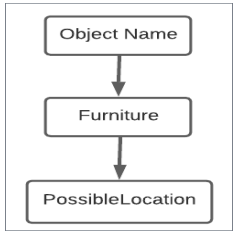

Figure 3: Basic structure

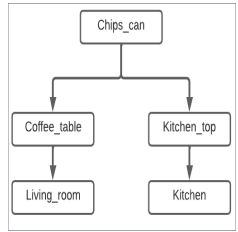

Figure 4: Example

  - Calculate the nearest possible location using the current location of the robot after localizing.

- Navigate through Possible Locations obtained from the ontology.
- Perceive the Furniture in the destination location using the perceive plane action and find the user specified object.
- If the object is found then pick up the object based on the perception results and pickup action.
- Move to next Possible Location and perceive the scene if the object is not found in the present location.

Project Changes

The changes made since mid-term:-

- Added ycb objects to the ontology structure.
- Calculate the nearest possible location from the current location of the robot.
- Integrated perception to find object action package.
- Integrated pickup action to find object action package.

Problems

- Services need to be restarted for running the code for the second run.
  - hsr_move_base_action
  - hsr_move_arm_action
  - hsr_pickup_action
- Need to do a 2D pose estimate in rviz every time you run the code to get the current location coordinates.
- If the robot is not localized properly, the robot gets stuck near some obstacles.

- Rosplan_interface stops working if the robot is force stopped before killing the running code.
- Need to delete the files in mongoDB_store folder in mas_knowledge_base/common.

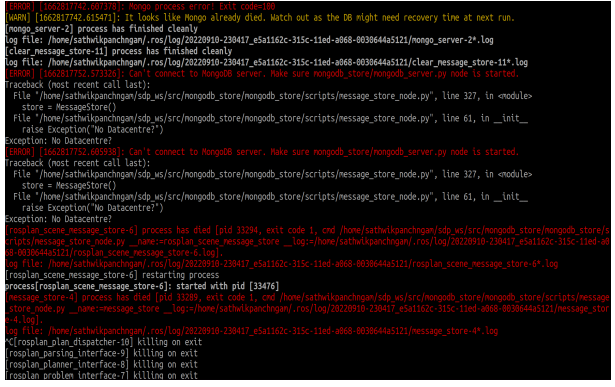

Figure 5: MongoDB error - rosplan_interface

- Misclassification of objects.

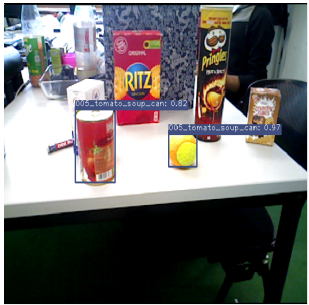

Figure 6: misclassified objects

Figure 7: misclassified objects

Figure 8: misclassified objects

Requirements

- Ontology
- Navigation goals from the map as a YAML file
- Detector
- Dependent Packages
  - hsr_move_base_action
  - hsr_move_arm_action
  - hsr_pickup_action

Project Demo

Thank You!