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General Solution To Find Objects

D4, D5, D6 Final Demonstration

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Contents

1. Project Goal
2. Mid-term Deliverable
3. Approach Used
4. Project Changes
5. Problems to be Solved
6. Requirements
7. Demo Video



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.

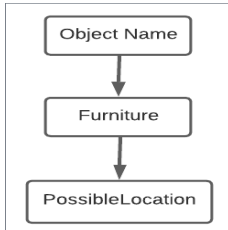


Figure 3: Basic structure

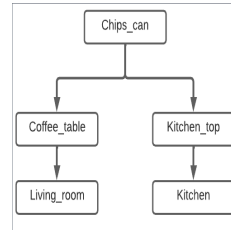


Figure 4: Example

- 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.

```
[ERROR] [1662817742.607378]: Mongo process error! Exit code=100
[WARN] [1662817742.615471]: It looks like Mongo already died. Watch out as the DB might need recovery time at next run.
[mongo_server-2] process has finished cleanly
log file: /home/sathwikpanchangan/.ros/log/20220910-230417_e5a1162c-315c-11ed-a068-0030644a5121/mongo_server-2*.log
[clear_message_store-11] process has finished cleanly
log file: /home/sathwikpanchangan/.ros/log/20220910-230417_e5a1162c-315c-11ed-a068-0030644a5121/clear_message_store-11*.log
[ERROR] [1662817752.573126]: Can't connect to MongoDB server. Make sure mongodb_store/mongodb_server.py node is started.
Traceback (most recent call last):
  File "/home/sathwikpanchangan/sdp_ws/src/mongodb_store/mongodb_store/scripts/message_store_node.py", line 327, in <module>
    store = MessageStore()
  File "/home/sathwikpanchangan/sdp_ws/src/mongodb_store/mongodb_store/scripts/message_store_node.py", line 61, in __init__
    raise Exception("No Datacentre?")
Exception: No Datacentre?
[ERROR] [1662817752.605938]: Can't connect to MongoDB server. Make sure mongodb_store/mongodb_server.py node is started.
Traceback (most recent call last):
  File "/home/sathwikpanchangan/sdp_ws/src/mongodb_store/mongodb_store/scripts/message_store_node.py", line 327, in <module>
    store = MessageStore()
  File "/home/sathwikpanchangan/sdp_ws/src/mongodb_store/mongodb_store/scripts/message_store_node.py", line 61, in __init__
    raise Exception("No Datacentre?")
Exception: No Datacentre?
[rosplan_scene_message_store-6] process has died [pid 33294, exit code 1, cmd /home/sathwikpanchangan/sdp_ws/src/mongodb_store/mongodb_store/scripts/message_store_node.py __name:=rosplan_scene_message_store __log:=/home/sathwikpanchangan/.ros/log/20220910-230417_e5a1162c-315c-11ed-a068-0030644a5121/rosplan_scene_message_store-6.log].
log file: /home/sathwikpanchangan/.ros/log/20220910-230417_e5a1162c-315c-11ed-a068-0030644a5121/rosplan_scene_message_store-6*.log
[rosplan_scene_message_store-6] restarting process
process[rosplan_scene_message_store-6]: started with pid [33476]
[message_store-4] process has died [pid 33289, exit code 1, cmd /home/sathwikpanchangan/sdp_ws/src/mongodb_store/mongodb_store/scripts/message_store_node.py __name:=message_store __log:=/home/sathwikpanchangan/.ros/log/20220910-230417_e5a1162c-315c-11ed-a068-0030644a5121/message_store-4.log].
log file: /home/sathwikpanchangan/.ros/log/20220910-230417_e5a1162c-315c-11ed-a068-0030644a5121/message_store-4*.log
^C[rosplan_plan_dispatcher-10] killing on exit
[rosplan_parsing_interface-9] killing on exit
[rosplan_planner_interface-8] killing on exit
[rosplan_problem_interface-7] killing on exit
```

Figure 5: MongoDB error - rosplan_interface

- Misclassification of objects.

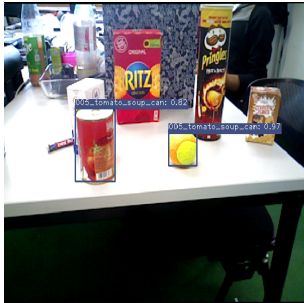


Figure 6: misclassified objects



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!

