

16-662

Robot Autonomy HW3

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Q2.

Code snippet for action 1 (the robot can move to a pantry if it is in the kitchen):

```
### Move to Pantry
Precond=np.zeros([nrObjects, nrPredicates])
# TODO: Robot in the kitchen and Robot not in the pantry
Precond[0][1] = 1
Precond[0][5] = -1

Effect=np.zeros([nrObjects, nrPredicates])
# TODO: Move robot from the kitchen to the pantry (remove from kitchen and add to
pantry)
Effect[0][1] = -2
Effect[0][5] = 2

ActionPre.append(Precond)
ActionEff.append(Effect)
ActionDesc.append("Move to Pantry from Kitchen")
```

Code snippet for action 2 (the robot can move to the kitchen if it is in the pantry):

```
### Move from Pantry
Precond=np.zeros([nrObjects, nrPredicates])
# TODO: Robot not in the kitchen and Robot in the pantry
Precond[0][1] = -1
Precond[0][5] = 1

Effect=np.zeros([nrObjects, nrPredicates])
# TODO: Move robot from the pantry to the kitchen (remove from pantry and add to
kitchen)
Effect[0][1] = 2
Effect[0][5] = -2

ActionPre.append(Precond)
ActionEff.append(Effect)
ActionDesc.append("Move to Kitchen from Pantry")
```

Code snippet for action 3 (the robot can cut fruit if the robot, knife, and fruit are in the kitchen and the fruit has not been cut):

```
###Cut fruit in kitchen
for j in [1,2]:
    Precond=np.zeros([nrObjects, nrPredicates])
    # TODO: Robot in the kitchen, fruit in the kitchen, knife in the kitchen, fruit
not chopped
    Precond[0][1] = 1
    Precond[j][1] = 1
    Precond[4][1] = 1
    Precond[j][6] = -1

    Effect=np.zeros([nrObjects, nrPredicates])
    # TODO: Fruit is chopped
    Effect[j][6] = 2

    ActionPre.append(Precond)
    ActionEff.append(Effect)
    ActionDesc.append("Cut "+Objects[j]+" in the kitchen")
```

Q3.

Dijkstra Search:

- Number of vertices after finding path: **5894**
- Length of final plan: **16**

```
● (base) williamfu@Williams-MacBook-Pro ~ % /usr/local/bin/python3 /Users/williamfu/Desktop/16_662_HW3/SymDiscreteSearch.py
Path Found: True
States Explored: 5894
Plan Length: 16

Plan:
Move to InKitchen from InHallway
Move to Pantry from Kitchen
Pick up Lemon from InPantry
Move to Kitchen from Pantry
Move to InHallway from InKitchen
Move to InOffice from InHallway
Pick up Knife from InOffice
Move to InHallway from InOffice
Move to InGarden from InHallway
Pick up Strawberry from InGarden
Place Lemon at InGarden
Move to InHallway from InGarden
Move to InKitchen from InHallway
Place Strawberry at InKitchen
Place Knife at InKitchen
Cut Strawberry in the kitchen
```

A* Search:

- Number of vertices after finding path: **2005**
- Length of final plan: **16**

```
● (base) williamfu@Williams-MacBook-Pro ~ % /usr/local/bin/python3 /Users/williamfu/Desktop/16_662_HW3/SymDiscreteSearch.py
Path Found: True
States Explored: 2005
Plan Length: 16

Plan:
Move to InKitchen from InHallway
Move to Pantry from Kitchen
Pick up Lemon from InPantry
Move to Kitchen from Pantry
Move to InHallway from InKitchen
Move to InGarden from InHallway
Pick up Strawberry from InGarden
Place Lemon at InGarden
Move to InHallway from InGarden
Move to InOffice from InHallway
Pick up Knife from InOffice
Move to InHallway from InOffice
Move to InKitchen from InHallway
Place Strawberry at InKitchen
Place Knife at InKitchen
Cut Strawberry in the kitchen
```