

Planning Lab - Lesson 2

Informed Search

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Start Your Working Environment

Start the previously installed (lesson 1) conda environment *planning-lab*

```
> cd Planning-Lab  
> conda activate planning-lab  
> jupyter notebook
```

To open the assignment navigate with your browser to: `lesson_2/lesson_2_problem.ipynb`

Uniform-Cost Search Example

At the beginning of *lesson_2/lesson_2_problem.ipynb* you can find an implementation of the last uninformed search algorithm you have seen in class, the Uniform-Cost Search (UCS). The pseudocode is in the next slide.

Uniform-Cost Search (UCS): graph search version

Input: *problem*

Output: *solution*

```
1: node  $\leftarrow$  a node with STATE = problem.INITIAL-STATE, PATH-COST = 0
2: frontier  $\leftarrow$  PRIORITY-QUEUE ordered by PATH-COST, with node as the only element
3: explored  $\leftarrow \emptyset$ 
4: loop
5:   if IS-EMPTY(frontier) then return FAILURE
6:   node  $\leftarrow$  REMOVE(frontier)
7:   if problem.GOAL-TEST(node.STATE) then return SOLUTION(node)
8:   explored  $\leftarrow$  explored  $\cup$  node.STATE
9:   for each action in problem.ACTIONS(node.STATE) do
10:    child  $\leftarrow$  CHILD-NODE(problem, node, action)
11:    if child.STATE not in explored or frontier then
12:      frontier  $\leftarrow$  INSERT(child, frontier)
13:    else
14:      if child.STATE is in frontier with higher path - cost then
15:        replace that frontier node with child
```

▷ Remove node with highest priority

▷ Increase path cost over parent

- Your assignments for this lesson are at: *lesson_2/lesson_2_problem.ipynb*.
You will be required to implement some informed search algorithms
- The pseudocodes are variations of the Uniform-Cost Search (UCS) where the *priority queue* is ordered by h and $f = g + h$ respectively