

AI Lab - Informed Search Strategies

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Start Your Working Environment

Update your repository to download the new lesson

Important: do a backup copy of your working directory to make sure you avoid any issue

```
> cd AI_Lab  
> git commit -a -m "a message describing the commit"  
> git pull  
> conda activate ai-lab  
> jupyter notebook
```

To open the assignment navigate with your browser to: [inf-search/inf_search_2_problem.ipynb](#)

Uniform-Cost Search Example

At the beginning of *inf-search/inf_search_2_problem.ipynb* you can find an implementation of the Uniform-Cost Search (UCS), using the graph search strategy. The pseudocode is in the next slide.

Uniform-Cost Search (UCS): graph search version

Require: *problem*

Ensure: *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 and not in 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: *inf-search/inf_search_2_problem.ipynb*.
You will be required to implement some informed search algorithms (Greedy Best First and A*)
- The pseudocodes are variations of the Uniform-Cost Search (UCS) where the *priority queue* is ordered by h and $f = g + h$ respectively