AI Lab - Session 2

Informed Search

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March 29^{th} 2019

UNIVERSITÀ
di **VERONA**
Dipartimento
di **INFORMATICA**

Start Your Working Environment

Start the previously installed (Session 1) conda environment *ai-lab*

Listing 1: Spin up

```
conda activate ai-lab
jupyter notebook
```

Uniform-Cost Search Example

At the beginning of *session2/session2_is.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)

Input: $problem$
Output: $solution$

1: $node \leftarrow$ a node with $\textsc{State} = problem.\textsc{Initial-State}, \textsc{Path-Cost} = 0$
2: $fringe \leftarrow \textsc{Priority-Queue}$ ordered by $\textsc{Path-Cost}$, with $node$ as the only element
3: $closed \leftarrow \emptyset$
4: **loop**
5: **if** $\textsc{Is-Empty}(fringe)$ **then return** $\textsc{Failure}$
6: $node \leftarrow \textsc{Remove}(fringe)$ ▷ Remove node with highest priority
7: **if** $problem.\textsc{Goal-Test}(node.\textsc{State})$ **then return** $\textsc{Solution}(node)$
8: **if** $node.\textsc{State}$ **not in** $closed$ **then**
9: $closed \leftarrow closed \cup node$
10: **for each** $action$ **in** $problem.\textsc{Actions}(node.\textsc{State})$ **do**
11: $child \leftarrow \textsc{Child-Node}(problem, node, action)$ ▷ Increase path cost over parent
12: $fringe \leftarrow \textsc{Insert}(child, fringe)$

Note: this is a graph search version

Assignments

- Your assignments for this session are at: *session2/session2.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 g and $h = f + g$ respectively