Artificial Intelligence project

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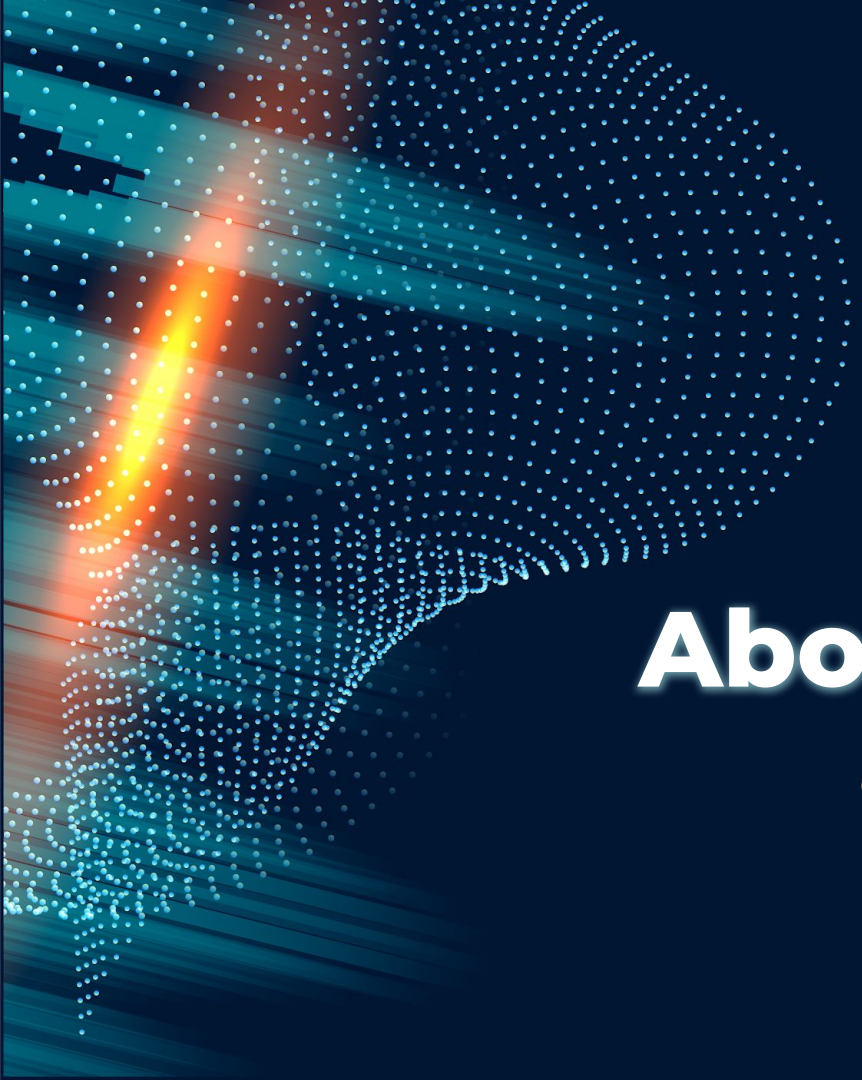


About the project

General description, roadmap and workflow

PROJECT DESCRIPTION

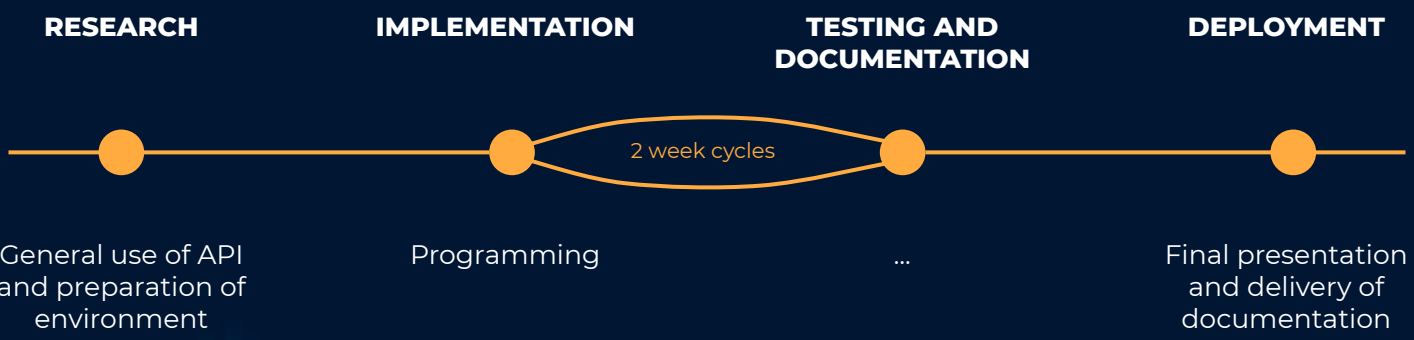
Artificial Intelligence for the popular Blizzard game, Starcraft 2. This will be done with Deepmind's PySC2 API.
We aim to be able to work on **Windows and Linux**

Objectives :

1. Implement small AI exercises (with the objective of learning the content of class)
2. Create an AI capable of playing some functionalities of Starcraft2
3. Document and register the results
    - IEEE Latex, one column journal

Delivery date: Not known yet (Estimated 16-23 of April 2021)

ROADMAP


RESEARCH
IMPLEMENTATION
TESTING AND DOCUMENTATION
DEPLOYMENT
2 week cycles
General use of API and preparation of environment
Programming
...
Final presentation and delivery of documentation

WORKFLOW

PySC2

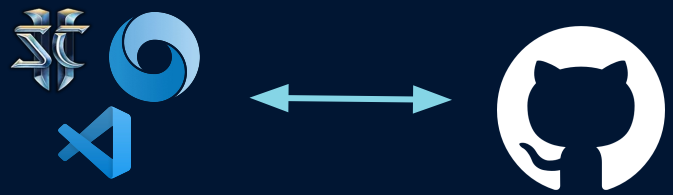
Starcraft 2,
Deepmind's PySC2,
Visual Studio Code

Github

Version control and
repository

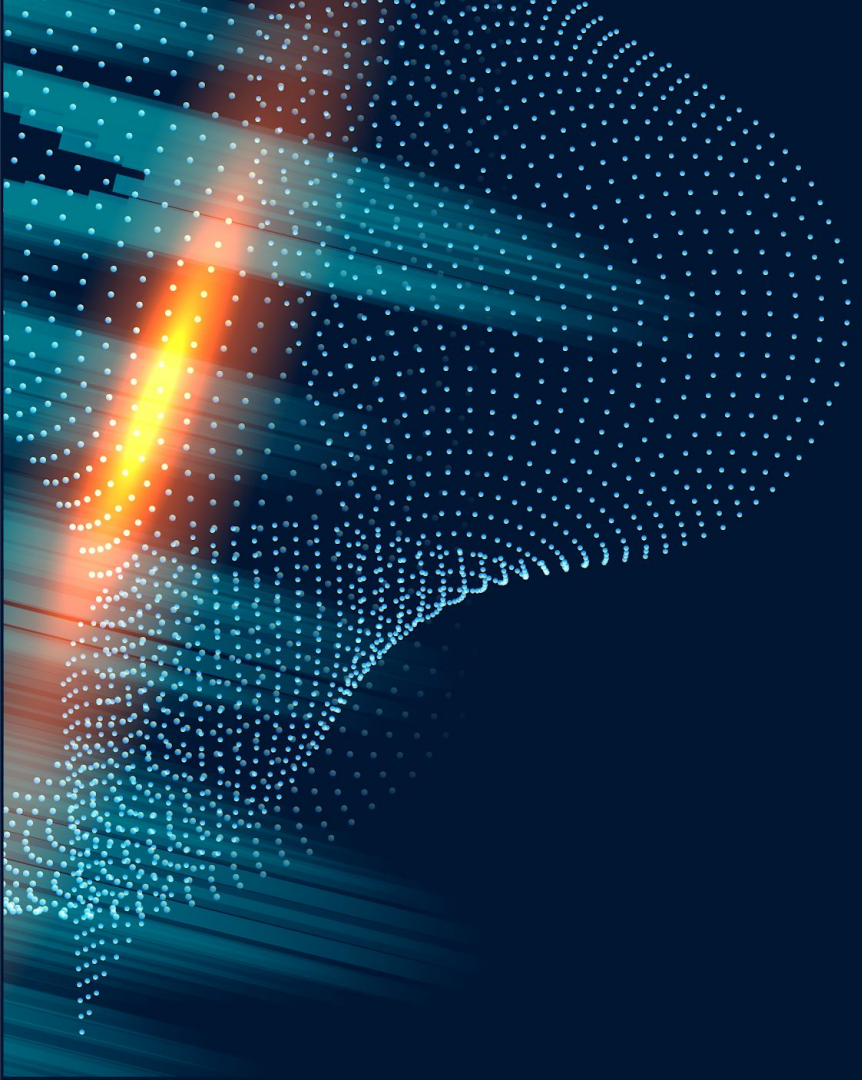
Machine learning

Google Colab,
Cluster for
processing



Our Github: https://github.com/Tonix22/MachineLearning_Project

PySC2: https://github.com/deepmind/pysc2



Part 1

IDS (Iterative Deepening Search)
BFI (Bellman Ford Implicit)

TASKS

20 January 2021 - 29 January 2021

- ✓ Installation of Starcraft 2 and PySC2
  - Make sure it works in Windows and Linux
- ✓ Workflow
- ✓ Setup of our Github
- Homework:
  - ✓ Implement IDS (Iterative Deepening Search)
  - ✓ Implement BFI (Bellman Ford Implicit)
  - Testing and results
  - Document in Latex

Objective

Map: MoveToBeacon

Find the Beacon and return its position/path to the Agent so it can move towards the target.

IDS: returns a node (position)

BFI: returns a list of nodes / stack (path)

Map: Move to beacon

A map with 1 Marine and 1 Beacon. Rewards are earned by moving the marine to the beacon. Whenever the Marine earns a reward for reaching the Beacon, the Beacon is teleported to a random location (at least 5 units away from Marine).

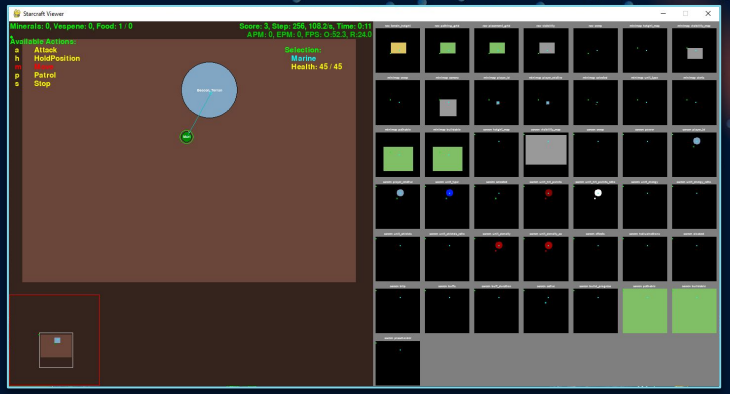
Initial State
- 1 Marine at random location (unselected)
- 1 Beacon at random location (at least 4 units away from Marine)

Rewards
- Marine reaches Beacon: +1

End Condition
- Time elapsed

Time Limit
- 120 seconds

Additional Notes
- Fog of War disabled
- No camera movement required (single-screen)



Screen Coordinates in Game

IDS (Iterative Deepening Search)

1. IDS
2. From Grid to Generate Tree for the IDS
3. Show Beta

From Grid → Generate Tree for the IDS

From Grid → Generate Tree for the IDS

X_MAP_SIZE= 84

Y_MAP_SIZE = 64

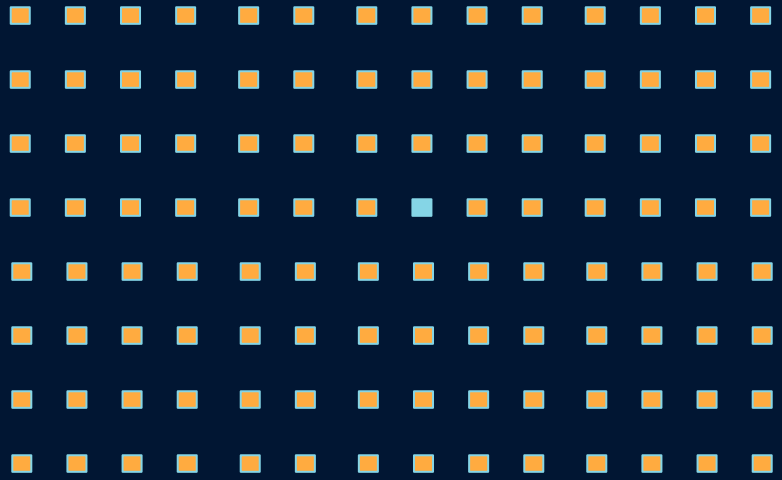
StepSize
Space between two cells in the grid

Offset
Space that is never used in the border of the map

#Generates macroblocks

Cols =
Ceil ((X_MAP_SIZE-offset*2)/stepSize)

Rows =
Ceil ((Y_MAP_SIZE-offset*2)/stepSize)

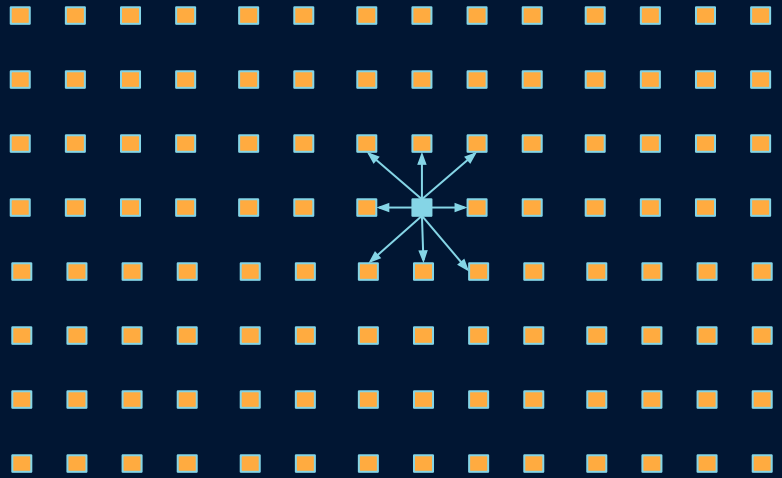


84x64
Max map coordinates

26 x 19
Grid currently used

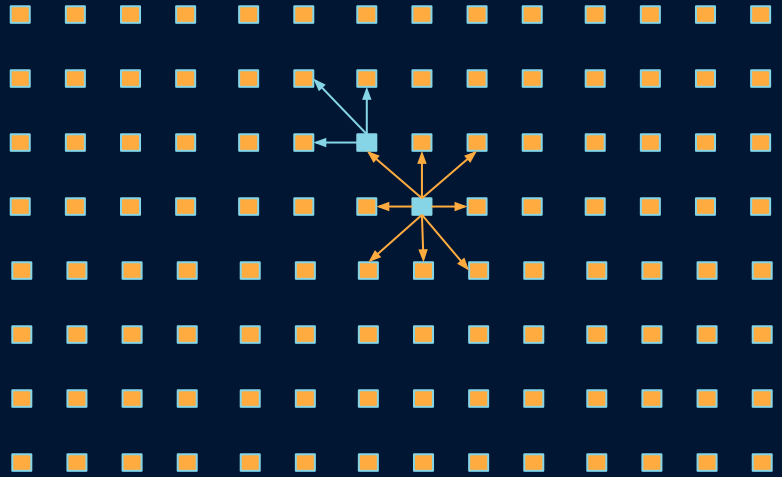
From Grid → Tree IDS : Expansion

First node expansion
The 8 immediate nodes



From Grid → Tree IDS : Expansion

Corner nodes expansion
3 node expansion



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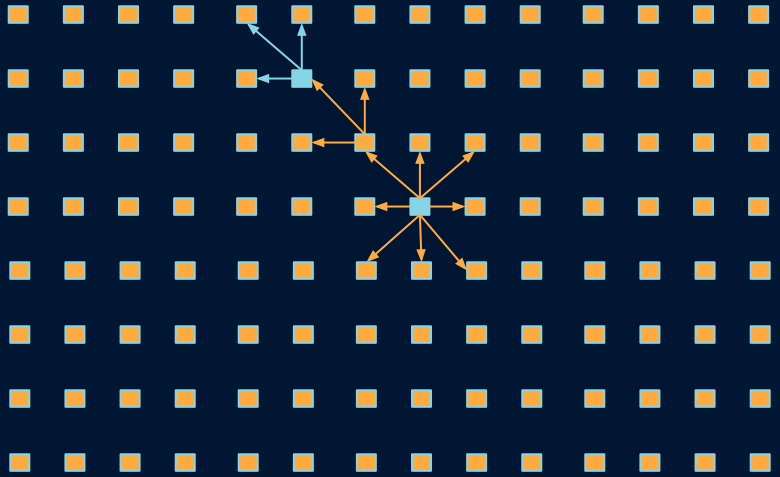
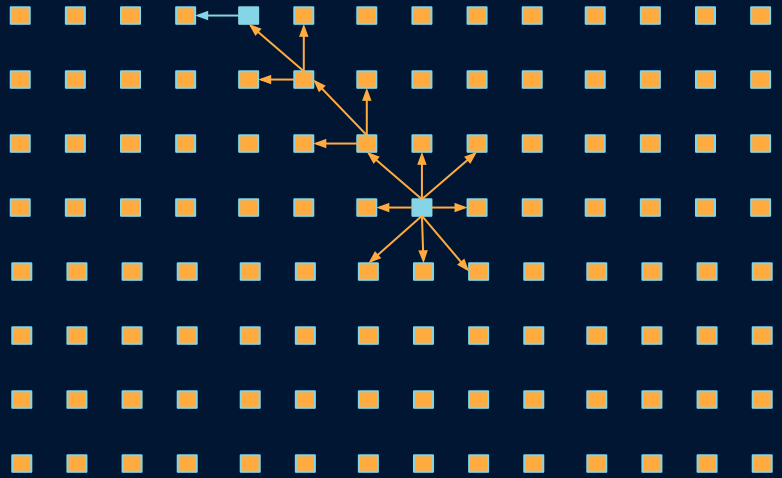
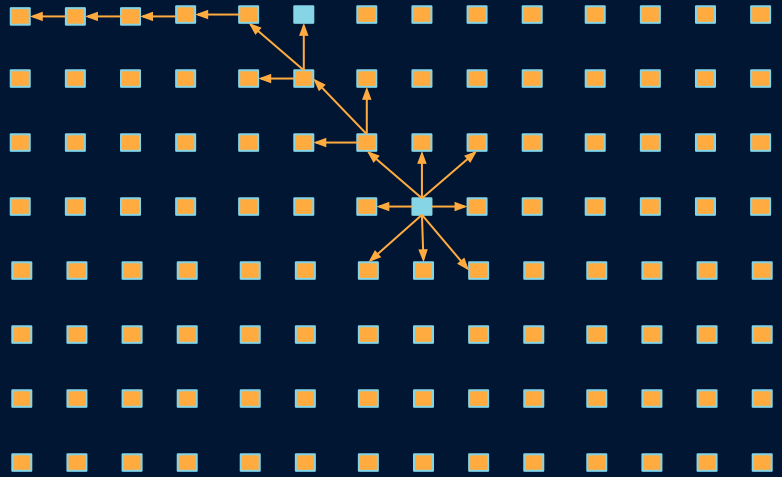


From Grid → Tree IDS : Expansion



Other nodes expansion
Just one node expansion

From Grid → Tree IDS : Expansion



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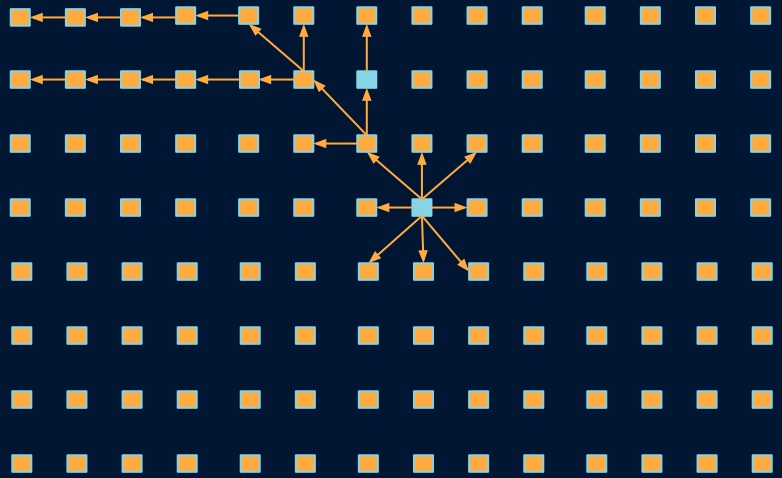
From Grid → Tree IDS : Expansion



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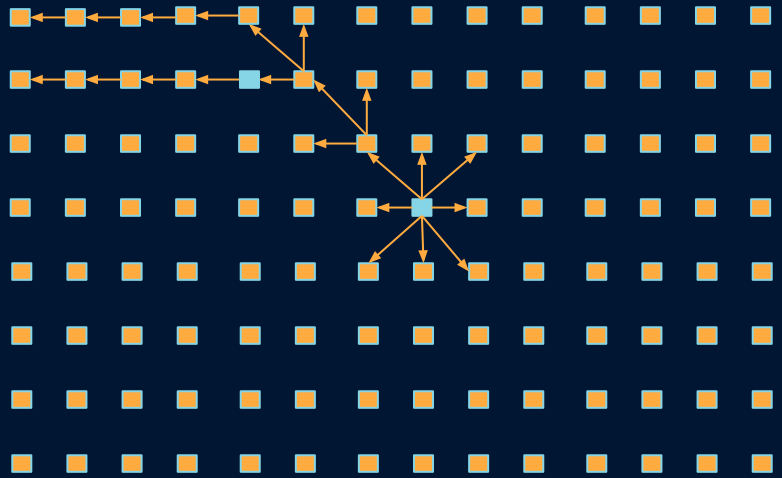
From Grid → Tree IDS : Expansion



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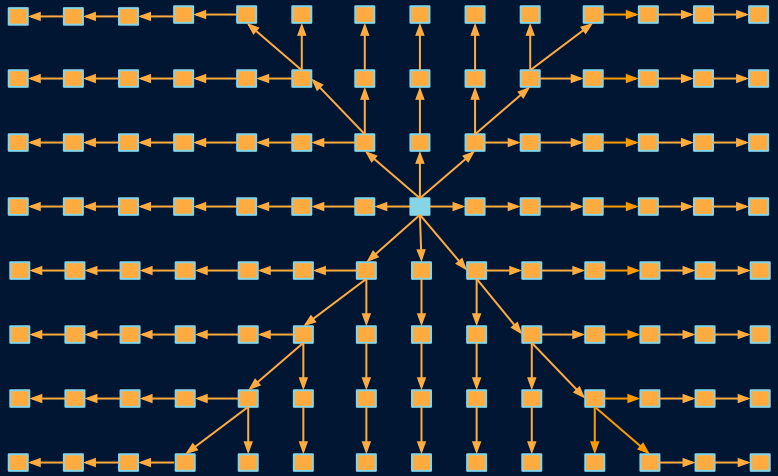
From Grid → Tree IDS : Expansion

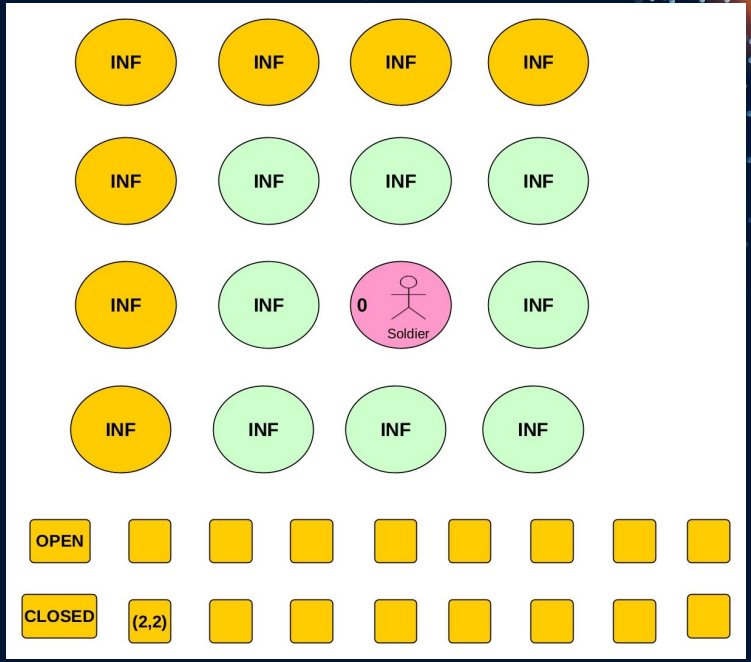


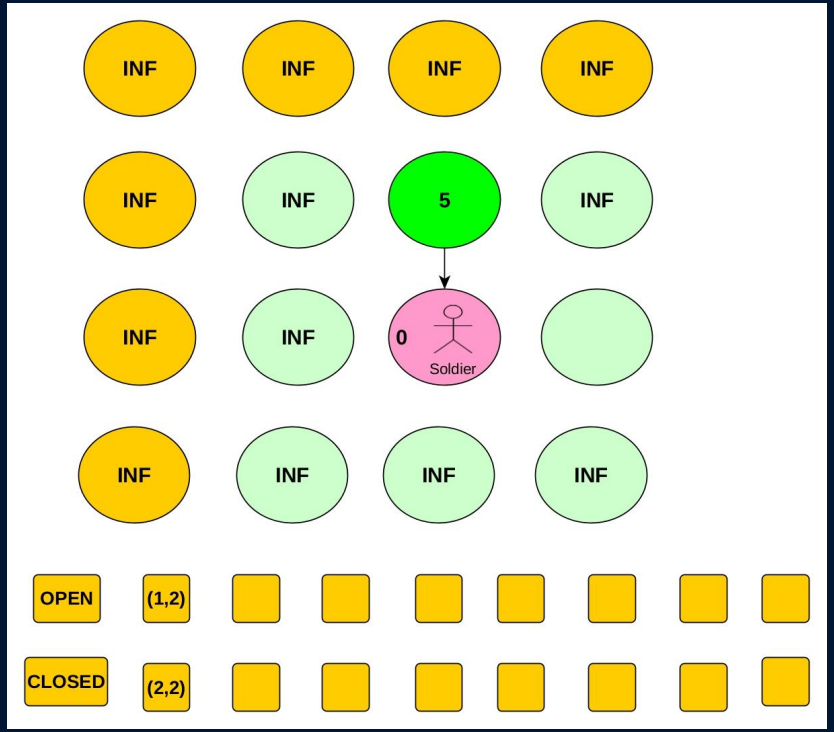
How it would expand to cover the grid

(only if the goal node was the last one checked)

BFI (Bellman Ford Implicit)

1. BFI
2. Como funciona en nuestro problema
   a. Generación del grid
3. Show Beta




INF
INF
INF
INF
INF
INF
5
INF
INF
INF
0
Soldier
INF
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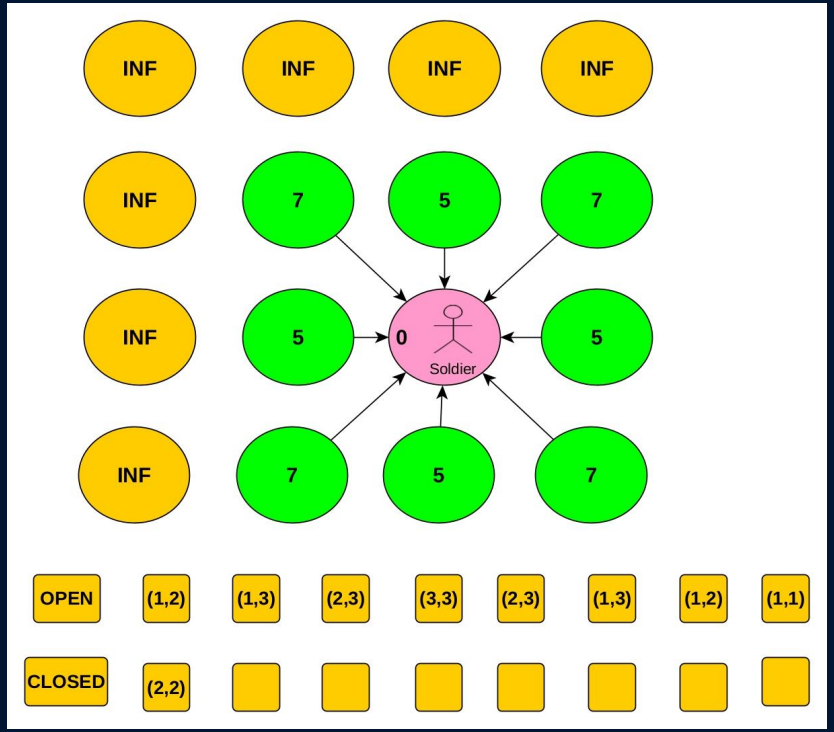
INF
OPEN
(1,2)
CLOSED
(2,2)


INF
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INF
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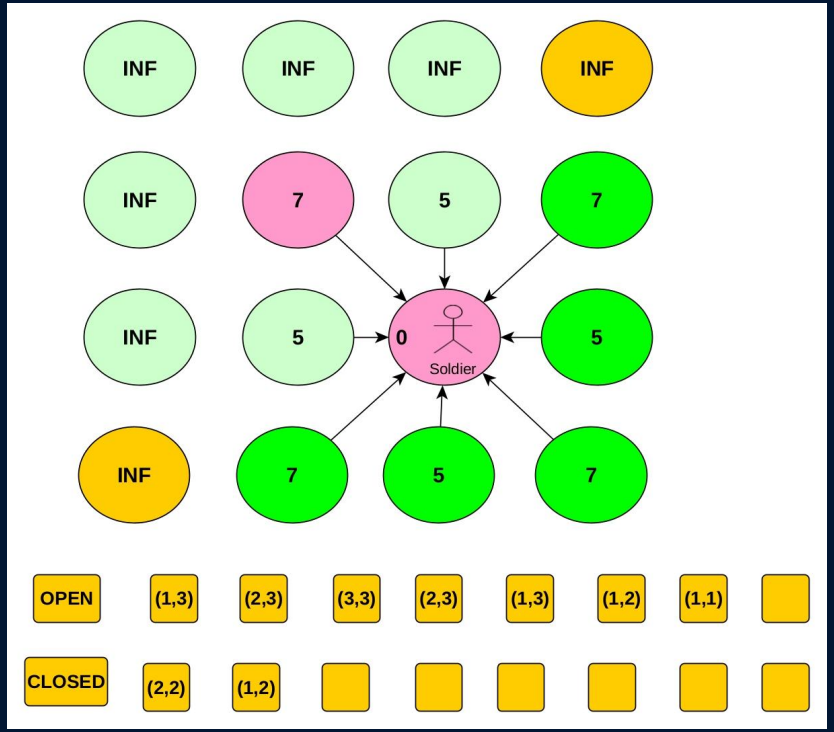
INF
7
5
7
INF
5
0
Soldier
5
INF
7
5
7
OPEN
(1,2)
(1,3)
(2,3)
(3,3)
(2,3)
(1,3)
(1,2)
(1,1)
CLOSED
(2,2)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(1,1)
CLOSED
(2,2)
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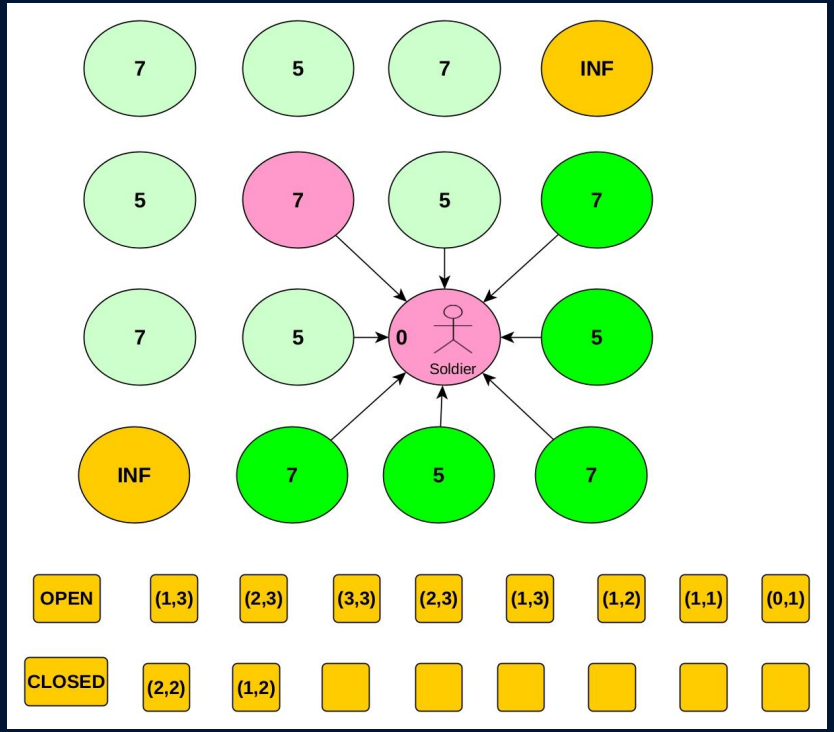
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OPEN
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(2,3)
(3,3)
(2,3)
(1,3)
(1,2)
(1,1)
(0,1)
CLOSED
(2,2)
(1,2)