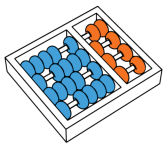
MC906A/MO416A - Introducition to Artificial Intelligence
Institute of Computing - Unicamp
First Semester 2020



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Project 1 - Deadline: 04/05/2020

1 Goal

To implement and evaluate solutions based on search methods for the problem described below using the AIMA function library (https://github.com/aimacode/aima-python/blob/master/search.ipynb). Your group is required to provide the solution implemeted with the following:

- Two search methods without information
- Two informed search methods with 2 distinct heuristics
- One local search method

The work consists of finding an adequate solution to the chosen problem, evaluating it according to: computational cost, completeness, optimality. Your are required to clearly define:

- How the problem was modeled
- Implementation specifics and restrictions

2 Problem

Pac-man is one of the most popular Arcade games, still played nowadays. In the game, there is a maze where Pac-man has to act to collect as many pieces as possible without being caught by one of the ghosts. The maze is defined in terms of a grid, as presented in Figure 1. The black areas are non-traversable walls, the grey path represents elements that should be caught by the agent, and the white areas are traversable areas. Your group should define additional elements, such as:

- The size and shape of the maze
- A final goal position
- The static positions of 3 Ghosts in the scene (the positions do not change during the game)
- Pac-man's initial position

To solve the problem, you have to specify:

- The state representation
- The set of actions
- The objective state test

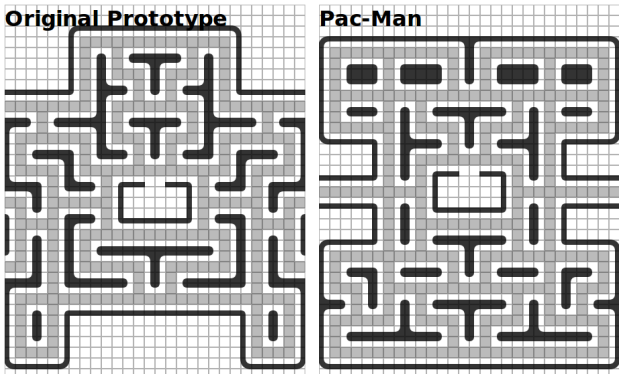

Figura 1: Sample maze. Extracted from: https://shaunlebron.github.io/pacman-mazegen/

- The cost of the path (g(x))
- The heuristics used

The system must be evaluated according to the quality of the solutions found and a critical evaluation is expected on the relationship between adopted parameters x solution performance. Graphs and tables representing the evolution of the solutions are expected. Additional comparisons with the literature are welcome, although they are not mandatory.

To evaluate the results you might change the following elements:

- Pac-man's initial position
- Goal position
- State discretization (maze size and configuration)
- Ghosts' position

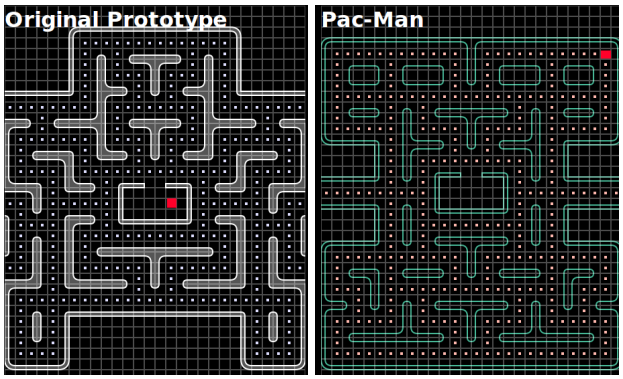

Figura 2: Resulting mazes with distinct configurations and goal positions (red square). Adapted from: https://shaunlebron.github.io/pacman-mazegen/

It is important to remember that we will not perform an online search. As the problem is completely observable and deterministic, Pac-man is going to reason about the solution before actually adopting it.

3 Programming language

As the reference library is written in Pyhton, we will adopt it as default language. However, interfacing with other languages is permitted once provided the reasons for such adoption.

4 Evaluation

The system should be evaluated according to the quality of the solutions found and a critical evaluation is expected on the relationship between adopted parameters x solution quality. Graphs, tables and images representing the results are expected. Further comparisons with the literature are welcome, although not mandatory. A link to a video of up to 2 minutes with recording of the solution running in the scene should be indicated in the report.

5 Groups

The groups must be composed of 5 members.

6 Report

The definition of the problem, the solution, and the results obtained must be presented in a report created as a Jupyter notebook. Please, make sure you put the graphs, tables, comparisons, and critical analysis in the notebook. The report should clearly indicate what the contribution of each team member was.