Knowledge Representation - W2 Lab: Problem Solving through Search

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I. Introduction

This weeks lab is based on the lecture on Problem Solving through Search [1]. This weeks lab aims to enhance your understanding of uninformed search strategies from both a practical and theoretical perspective.

A. Prep-work

Review and complete the following:

- search.ipynb - Jupyter notebook
- search.py - underlying library containing majority of implementation code.

Note: Your solution should be generated in Spyder as a .py file importing code as required from the AIMA repo (See the file provided for an example of importing it form a sub-directory). I will not accept .ipynb submissions and your code should import what it needs from a parent directory (no libraries to be submitted along with solutions).

B. Discover Ireland - Uninformed search

Generate a graph based representation of Irish towns, cities, villages that adheres to the following requirements.

1) Contains at least 15 nodes.
2) At least 5 nodes have a branching factor of 3.
3) At least one path with a depth of 8.

Generate three problem statements that will be used to evaluate the uninformed search strategies. These should be designed to demonstrate some property of the search approach which you found interesting - briefly discuss. Compare the following search approaches performance:

- breadth_first_tree_search
- breadth_first_graph_search
- depth_first_tree_search
- depth_first_graph_search.
- depth_limited_search
- iterative_deepening_search
- bidirectional_search

Use the functionality made available by "search.py" (line 1500+) in order to compare your approaches. Provide a table of results for each problem statement and a rationale as the primary differentiation between graph and tree based approaches. Similarly discuss the pro's con's of each approach from your understanding of the theory and experimental validation. (print outs or comments in python - your call)

II. Submission

Submit your solution by the due date as a single ".py" file using the following naming convention.

"W<Week_num>_Lab_<Surname>_<First name>_<Student Number>.py"
e.g.
"W2_Lab_OReilly_Ruairi_R123456.py"

References

[1] S. Russell and P. Norvig, "Ai a modern approach," Learning, 2005.