UNIVERSITEIT VAN PRETORIA
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Engineering, Built Environment and IT
Department of Computer Science

COS 314

Assignment 1 -Search Space Representation

Due 07 April 2022

Question (25 Marks)

1. The 8-puzzle problem is a well studied problem in artificial intelligence. This assignment involves comparing the performance of the breadth first-search, best-first search, hill-climbing, and the A* algorithm in solving instances of the 8-puzzle problem of differing difficulty. The searches must be implemented to solve the instances of the 8-puzzle problem and the performance discussed in a report. The searches must be evaluated on the the ten 8-puzzle instances listed in Table 1. The program and the report must be submitted via the course website. The program must be executable and be able to run without linking to libraries via the IDE. Please note the programs will not be run in IDEs (Java preferred). The report should include the following

    1. A description of the heuristic/s used for the informed searches.
    2. The performance of each of the searches for the 10 instances in terms of the number of moves needed including difference from the known optimum.
    3. Overall discussion of the performance of the searches.

Table 1: 8-Puzzle Problem Instances.

Instance	Start State	Goal State	Known Optimum
1	123804765	134862705	5
2	123804765	281043765	9
3	123804765	281463075	12
4	134805726	123804765	6
5	231708654	123804765	14
6	231804765	123804765	16
7	123804765	231804765	16
8	123804765	567408321	30
9	876105234	123804765	28
10	867254301	123456780	31

Reference

Pillay, N. (2015). Intelligent system design using hyper-heuristics. South African Computer Journal, 56(1), 107-119.