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CS 180 THR

N-Puzzle Solver Analysis

Local Computer Specifications:
Processor: Quad Core CPU @ 2.60 GHz
Memory: 8 GB RAM

	Case 1 (configurations/runtime)	Case 2 (configurations/runtime)	Case 3 (configurations/runtime)
Without heuristics	502 / 0.003072 s	1,391,808 / 10.442740 s	418 / 0.003171 s
Manhattan Distance	29 / 0.000993 s	89,495 / 1.515809 s	20 / 0.000669 s
Linear Conflict	24 / 0.002376 s	8807 / 0.663563 s	20 / 0.004934 s
Misplaced Tiles	42 / 0.000745 s	860,904 / 8.860482 s	42 / 0.000446 s
Tiles out of row and column	29 / 0.000965 s	312,020 / 5.203154 s	20 / 0.000684 s
N-maxswap	40 / 0.001132 s	634932 / 11.214739 s	20 / 0.000386 s

Number of configurations and runtimes of each case for each heuristic function

Based on the results from the tests, the best heuristic to use for the N-puzzle is the Linear Conflict (with Manhattan Distance).

Without any heuristic, Cases 1 and 3 runtime values are close to their runtimes with heuristics. On Case 2, running without heuristics is much better than running the solver with N-maxswap but still runs slower when Misplaced Tiles is used. The program runs around 16 times slower than running A* with Linear Conflict. In terms of space, compared to when using Linear Conflict, Case 1 uses up about 21 times more space, Case 2, 158 times more, and Case 3, around 21 times more.