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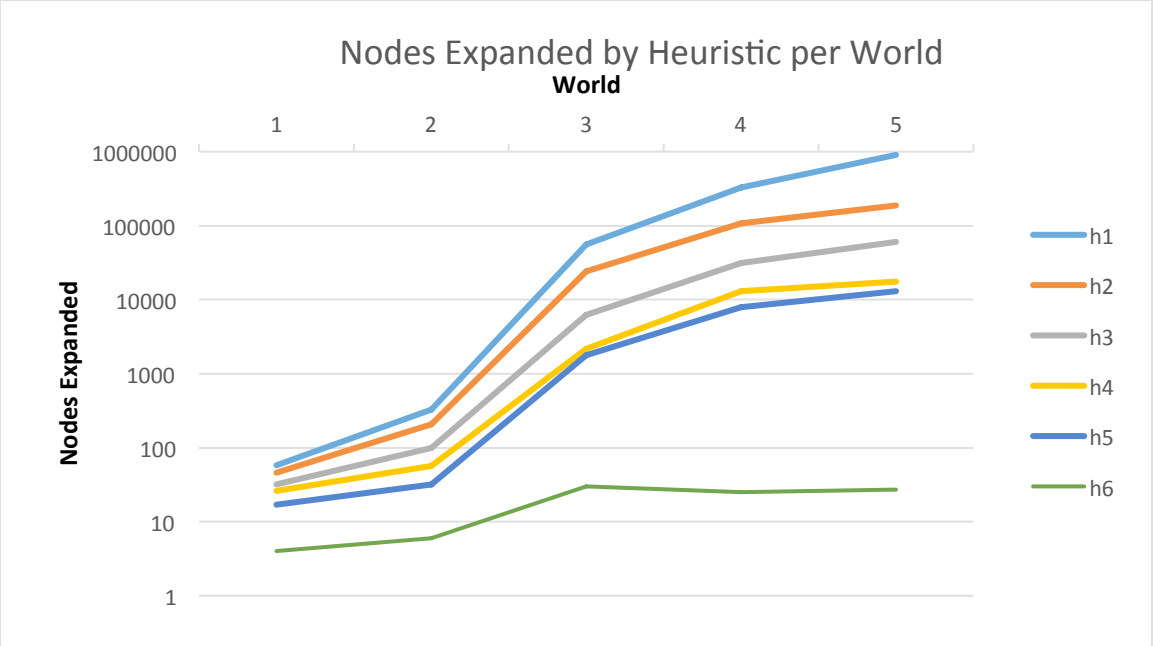
CS 4341

Assignment 1 – A* Search

Results Table

Board	Heuristic	Score	# Actions	# Nodes expanded	Branching factor
Test 1	1	86	6	58	1.97
Test 1	2	86	6	46	1.89
Test 1	3	86	6	32	1.78
Test 1	4	86	6	26	1.72
Test 1	5	86	6	17	1.60
Test 1	6	86	6	4	1.26
Test 2	1	78	8	328	2.06
Test 2	2	78	8	209	1.95
Test 2	3	78	8	100	1.78
Test 2	4	78	8	57	1.66
Test 2	5	78	8	32	1.54
Test 2	6	78	8	6	1.25
Test 3	1	64	16	55,337	1.98
Test 3	2	64	16	24,127	1.88
Test 3	3	64	16	6,184	1.73
Test 3	4	64	16	2,182	1.62
Test 3	5	64	16	1,787	1.60
Test 3	6	64	16	30	1.24
Test 4	1	54	19	330,685	1.95
Test 4	2	54	19	106,603	1.84
Test 4	3	54	19	31,037	1.72
Test 4	4	54	19	12,957	1.65
Test 4	5	54	21	7,903	1.53
Test 4	6	52	20	25	1.17
Test 5	1	50	24	908,616	1.77
Test 5	2	50	24	186,319	1.66
Test 5	3	50	24	59,911	1.58
Test 5	4	50	24	17,504	1.50
Test 5	5	50	24	13,065	1.48
Test 5	6	46	20	27	1.18



In general, the efficiency increases dramatically as the heuristics improve. Especially for the larger boards, the number of nodes expanded is reduced significantly when using a heuristic versus not using a heuristic. For example for board 5, 908,616 nodes were expanded without a heuristic, but only 186,319 were expanded using heuristic 2. Our h5, which accounts for turns, is slightly better than h4, though the difference is not as notable as those between the other heuristics.

Heuristic 6 has a significantly lower branching factor, which by itself would imply efficiency. For instance, on test 5, it only expanded 27 nodes, whereas heuristic 5 expanded over 13000. Even without knowing it is inadmissible, that would be something worth examining. However, while heuristic 6 does return *an* answer, as the grids become large the answers cease to be optimal. (In our smaller grids it tended to return the same path as heuristic 5)