

# Heuristic Analysis

I have tested three uniformed planning and two automatic heuristics algorithms. The results are shown below:

	Time			Number of Nodes			Best Solution		
	p1	p2	p3	p1	p2	p3	p1	p2	p3
breadth_first_search	0.069	24.13	153.4	180	30509	129631	6	9	12
uniform_cost_search	0.088	29.04	131.0	224	43064	156103	6	9	12
depth_first_graph_search	0.019	16.10	5.2	48	14863	4927	12	1444	571
h_ignore_preconditions	0.070	8.49	35.6	170	12414	40955	6	9	12
h_pg_levelsum	0.348	26.91	111.4	50	779	2281	6	9	13

The table shows that all algorithm runs very fast on problem one.

On problem two and three, ignore\_preconditions algorithm is fast, stable, and expand relative less number of nodes. Breadth\_first\_search and uniform\_cost\_search behave very similar and have no advantage over the ignore\_precondition heuristic. Depth\_first\_graph\_serach is the fastest for problem three, however, the solution is always not the best. And its solution is also not very stable: in this case, we are lucky enough to find the right solution fast, however, this doesn't mean it works for many other situations. The levelsum algorithm is defeated by ignore\_precondition for three problems in terms of running time and ability to find the best solution. However, it expands much less number of nodes. Therefore, the levelsum algorithm has great potential in solving more difficult problems.

The ignore\_precondition algorithm use a simple and efficient heuristic to avoid searching many unnecessary branches. The other heuristic, levelsum, need to build the planninggraph, thus has a high overhead. So it defeated by ignore\_precondition in terms of running time.

In conclusion, I think the ignore\_precondition algorithm is the best one for all three problems in terms of running time and robustness.