Intro to AI Lab (1)

Informed/Uninformed Search Algorithms

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Test Cases

Solvable Case 1

Initial state: 3 7 5

6 1 4

2 _ 8

	Time (ms)	Path Length	Search Depth	Nodes Expanded
BFS	124.7878	19	19	34184
DFS	381.9986	64101	66123	109421
Euclidean A*	11.0028	19	19	466
Manhattan A*	4.9982	19	19	280

BFS path, Euclidean A*, Manhattan A* path = [

'3756_4218', '375_64218', '375264_18', '3752641_8', '3752_4168', '3_5274168', '_35274168', '235_74168', '235174_68', '2351746_8', '2351_4678', '2_5134678', '_25134678', '125_34678', '1253_4678', '12534_678', '12_345678', '1_2345678', '_12345678'

]

Solvable Case 2

Initial state: 7 8 3

1 _ 6

4 2 5

	Time (ms)	Path Length	Search Depth	Nodes Expanded
BFS	265.9674	22	22	84935
DFS	77.9655	24792	24792	25853
Euclidean A*	18	22	22	740
Manhattan A*	5.02	22	22	240

BFS path, Euclidean A*, Manhattan A* path = [

'7831264_5', '78312645_', '78312_456', '7831_2456', '7_3182456', '73_182456', '73218_456', '7321_8456', '7321584_6', '73215846_', '73215_468', '7321_5468', '732_15468', '_32715468', '3_2715468', '3127_5468', '312_75468', '312475_68', '3124756_8', '3124_5678', '312_45678', '_12345678'

]

Unsolvable Case 1

Initial state: 4 _ 1

6 8 2

7 5 3

	Time (ms)	Search Depth	Nodes Expanded
BFS	807.8644	31	181440
DFS	707.9996	66123	181440
Euclidean A*	5022.6734	31	181440
Manhattan A*	4575.4258	31	181440

Unsolvable Case 2:

Initial state: 2 6 4

8 7 1

5 _ 3

	Time (ms)	Search Depth	Nodes Expanded
BFS	731.2709	31	181440
DFS	687.5625	66123	181440
Euclidean A*	4104.6774	31	181440
Manhattan A*	3189.2672	31	181440

Average Performance

Unsolvable Cases

	Average running time (ms)
BFS	594.270833
DFS	580.7291666
Euclidean A*	3856.25
Manhattan A*	3192.70833333

This data was gathered by taking the average running time over 30 iterations

Solvable Cases

	Time (ms)	Path Length	Search Depth	Nodes Expanded
BFS	313.15625	21.817	21.817	91475.992
DFS	367.453125	44535.745	60038.501	111209.762
Euclidean A*	60.078125	21.817	21.817	2418.889
Manhattan A*	29.9375	21.817	21.817	1462.43

This data was gathered by taking the average values over 1000 iterations

Manhattan distance heuristic A* search algorithm is the most efficient in time. This is because it is more admissible than the Euclidean distance. Its values are nearer to the actual values of the path lengths.