Assignment: A* to solve the modified n-puzzle problem

Intelligent Systems CS3612

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I have chosen 2 heuristics Hamming_distance which corresponds to the no of misplaced tiles and Manhattan distance which corresponds to no of tiles to reach the position in goal.

When I run the code both Manhattan and Hamming give same final moves to most of the inputs. So I counted the no.of time node is taken from open list and traversed and used that number to compare both cases. The result is given below.

Size of square	Nodes Traversed by hamming	Nodes Traversed by Manhattan
5x5	50	50
5x5	11	11
5x5	4	4
5x5	14	14
5x5	2925	1379
5x5	70	42
6x6	11	11
6x6	41	41
6x6	19	16
6x6	642	932
6x6	28	22
6x6	11	11
7x7	4	4
7x7	41	41
7x7	4	4
7x7	25	25
7x7	129	129
7x7	364	336
8x8	95	84
8x8	182	182
8x8	41	41
8x8	336	336
8x8	246	246
8x8	660	82
8x8	208	276
8x8	91	91
9x9	11	11
9x9	582	582
9x9	6	5

Size of square	Nodes Traversed by hamming	Nodes Traversed by Manhattan
9x9	14	13
9x9	14	14
9x9	25	25
9x9	91	91
10x10	246	246
10x10	19	16
10x10	29	29
10x10	419	311
10x10	336	336
10x10	63	63
10x10	154	154
10x10	1507	1507
10x10	375	375
11x11	2211	2211
11x11	6046	298
11x11	175	175
11x11	86	31
11x11	41	41
11x11	1507	1507
11x11	50	50
11x11	375	375
11x11	25	25
12x12	5	5
12x12	37	37
12x12	41	41
12x12	154	154
12x12	246	246
12x12	63	63
12x12	25	25

Size of square	Nodes Traversed by hamming	Nodes Traversed by Manhattan
12x12	336	336
12x12	550	550
12x12	63	63
13x13	19	16
13x13	246	246
13x13	29	29
13x13	8	8
13x13	25	25
13x13	91	91
13x13	1254	1254
13x13	29	29
13x13	336	336
14x14	50	50
14x14	11	11
14x14	41	41
14x14	647	632
14x14	375	375
14x14	5	5
14x14	11	11
15x15	22	22
15x15	4	4
15x15	11	111
15x15	41	41
15x15	154	154
15x15	14	14
15x15	67	67
15x15	25	25
15x15	336	336
16x16	91	91

Size of square	Nodes Traversed by hamming	Nodes Traversed by Manhattan
16x16	63	63
16x16	550	550
16x16	4	4
17x17	91	91
17x17	2	2
17x17	3718	3718
18x18	50	50
18x18	41	41
18x18	22	22
19x19	179	102
20x20	11	11
20x20	375	375

Analysis

Mean Difference = 7825/100 =78.25

Standard Deviation =570.959

Standard Error of Mean Difference=570.959/10=57.0959

T-value=78.25/57.0959=1.3705

Confidence level of 95% chosen.

Degree of freedom = 99

Two tailed P value=0.17363

The result is not significant at $p < .05$