(1) Change the heuristic function for the two search programs, and compare the number of searched nodes and solution depth for one simple case(A\* d<20) and one hard case(A\* d>25) . Write your discussion.

The simple case

6

0 5 4 3 2 1  //起始棋盤

0 1 2 3 4 5  //目標 find depth = 16

#generated node

|  |  |  |  |
| --- | --- | --- | --- |
|  | H0(h=0) | H1(h=differences) | H2(h=distances) |
| Greedy Search | 1986 | 429 | 199 |
| A\* | 648 | 648 | 530 |

depth

|  |  |  |  |
| --- | --- | --- | --- |
|  | H0(h=0) | H1(h=differences) | H2(h=distances) |
| Greedy Search | 66 | 54 | 28 |
| A\* | 16 | 16 | 18 |

The hard case

8

0 6 5 4 3 2 1 8 //起始棋盤

8 1 2 5 3 4 0 6 //目標 find depth =27

#generated node

|  |  |  |  |
| --- | --- | --- | --- |
|  | H0(h=0) | H1(h=differences) | H2(h=distances) |
| Greedy Search | 76219 | 5792 | 15428 |
| A\* | 45215 | 33976 | 23775 |

depth

|  |  |  |  |
| --- | --- | --- | --- |
|  | H0(h=0) | H1(h=differences) | H2(h=distances) |
| Greedy Search | 2871 | 155 | 93 |
| A\* | 27 | 27 | 35 |

Discussion:

H1:判斷目前盤面與最終盤面的差異，位置不同的加一計算。

H2:計算錯誤盤面的位置與最終盤面的位置距離。

可以發現新增heuristic function能有效的減少產生的節點與收尋的深度。

(2) Develop another heuristic H3 for the A\* algorithm. Compare with H0, H1, and H2.

#generated node

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | H0(h=0) | H1(h=differences) | H2(h=distances) | H3 |
| Greedy Search | 1986 | 429 | 199 | 218 |
| A\* | 648 | 648 | 530 | 712 |

depth

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | H0(h=0) | H1(h=differences) | H2(h=distances) | H3 |
| Greedy Search | 66 | 54 | 28 | 24 |
| A\* | 16 | 16 | 18 | 16 |

