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CSE 415 HW3: Heuristics and A\* Search

**Item 8: Heuristics for the Eight Puzzle**

**Uniform Cost Search (No Heuristics)**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Problem** | **Puzzle** **Permutation** | **Success** | **Aborted** | **Solution Length** | **Total Cost** | **States Expanded** | **Max OPEN Length** |
| A | [3,0,1,6,4,2,7,8,5] | Y | N | 7 | 7 | 166 | 101 |
| B | [3,1,2,6,8,7,5,4,0] | Y | N | 12 | 12 | 1490 | 898 |
| C | [4,5,0,1,2,8,3,7,6] | Y | N | 14 | 14 | 4070 | 2290 |
| D | [0,8,2,1,7,4,3,6,5] | Y | N | 16 | 16 | 7982 | 4700 |

**A\* Search With Hamming Heuristic**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Problem** | **Puzzle** **Permutation** | **Success** | **Aborted** | **Solution Length** | **Total Cost** | **States Expanded** | **Max OPEN Length** |
| A | [3,0,1,6,4,2,7,8,5] | Y | N | 7 | 7 | 7 | 6 |
| B | [3,1,2,6,8,7,5,4,0] | Y | N | 12 | 12 | 94 | 72 |
| C | [4,5,0,1,2,8,3,7,6] | Y | N | 14 | 14 | 189 | 127 |
| D | [0,8,2,1,7,4,3,6,5] | Y | N | 16 | 16 | 589 | 368 |

**A\* Search With Manhattan Heuristic**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Problem** | **Puzzle** **Permutation** | **Success** | **Aborted** | **Solution Length** | **Total Cost** | **States Expanded** | **Max OPEN Length** |
| A | [3,0,1,6,4,2,7,8,5] | Y | N | 7 | 7 | 7 | 6 |
| B | [3,1,2,6,8,7,5,4,0] | Y | N | 12 | 12 | 33 | 25 |
| C | [4,5,0,1,2,8,3,7,6] | Y | N | 14 | 14 | 56 | 39 |
| D | [0,8,2,1,7,4,3,6,5] | Y | N | 16 | 16 | 148 | 96 |

* All heuristic runs completed within a second or two