

A3 Report

By Dan Wang (daw1230)

Heuristics for Eight Puzzle

| Puzzle | Heuristic | Solved? | # Edges | Cost | # Expanded | Max OPEN |
|--------|-----------|---------|---------|------|------------|----------|
| A | Non (UCS) | Yes | 7 | 7 | 166 | 101 |
| A | Hamming | Yes | 7 | 7 | 7 | 6 |
| A | Manhattan | Yes | 7 | 7 | 7 | 6 |
| B | Non (UCS) | Yes | 12 | 12 | 1490 | 898 |
| B | Hamming | Yes | 12 | 12 | 95 | 72 |
| B | Manhattan | Yes | 12 | 12 | 34 | 25 |
| C | Non (UCS) | Yes | 14 | 14 | 4070 | 2290 |
| C | Hamming | Yes | 14 | 14 | 195 | 127 |
| C | Manhattan | Yes | 14 | 14 | 56 | 39 |
| D | Non (UCS) | Yes | 16 | 16 | 7982 | 4700 |
| D | Hamming | Yes | 16 | 16 | 592 | 368 |
| D | Manhattan | Yes | 16 | 16 | 155 | 98 |

Puzzle A: [3,0,1,6,4,2,7,8,5]

Puzzle B: [3,1,2,6,8,7,5,4,0]

Puzzle C: [4,5,0,1,2,8,3,7,6]

Puzzle D: [0,8,2,1,7,4,3,6,5]

A-Star Implementation to FranceWithDXHeuristic

```
Python 3.7.4 Shell
Python 3.7.4 (v3.7.4:e09359112e, Jul 8 2019, 14:54:52)
[Clang 6.0 (clang-600.0.57)] on darwin
Type "help", "copyright", "credits" or "license()" for more information.
>>>
RESTART: /Volumes/GoogleDrive/My Drive/01-Courses/UW/CSE315 Introduction to Artificial Intelligence/hw3/a3-starter-code/AStar.py

Welcome to UCS, by Dan Wang!
Initial State:
Rennes
len(OPEN)=1; len(CLOSED)=0; COUNT = 0
len(OPEN)=4; len(CLOSED)=1; COUNT = 1
len(OPEN)=7; len(CLOSED)=2; COUNT = 2
len(OPEN)=8; len(CLOSED)=3; COUNT = 3
len(OPEN)=7; len(CLOSED)=4; COUNT = 4
len(OPEN)=6; len(CLOSED)=5; COUNT = 5
len(OPEN)=6; len(CLOSED)=6; COUNT = 6
len(OPEN)=6; len(CLOSED)=7; COUNT = 7
len(OPEN)=7; len(CLOSED)=8; COUNT = 8
len(OPEN)=6; len(CLOSED)=9; COUNT = 9
len(OPEN)=5; len(CLOSED)=10; COUNT = 10
len(OPEN)=4; len(CLOSED)=11; COUNT = 11
len(OPEN)=4; len(CLOSED)=12; COUNT = 12
Congratulations on finding a route to Avignon!
Solution path:
Rennes
Nantes
Limoges
Lyon
Avignon
Total cost: 1041.0
12 states expanded.
MAX_OPEN_LENGTH = 8
>>>
```