CS 4341: Astar Output

Map 1: random

9 7 7 2 7 2 8 7 3 8 9 9 4 8 1 5 9 2

5 9 # 3 **G** 4 6 5 8 2 4 6 2 4 1 8 1 4

4 9 5 4 3 2 9 8 # 7 3 9 5 7 # 1 7 7

4 3 3 1 7 1 4 2 6 4 6 5 5 6 6 7 6 4

8 8 2 1 8 4 5 8 3 9 7 8 7 3 4 6 1 2

2 3 4 9 8 6 9 3 6 6 5 8 6 9 9 4 4 2

9 6 3 9 7 8 5 9 1 9 5 5 2 9 1 9 4 5

1 6 7 5 9 1 7 4 1 6 8 1 5 2 1 6 5 2

5 7 6 8 9 # 5 1 7 6 2 1 7 1 6 1 # 3

8 7 7 5 7 8 2 6 3 2 1 # 7 2 2 2 8 5

3 4 5 2 5 8 7 5 2 5 5 8 9 5 4 7 1 5

9 8 9 1 7 1 3 8 3 2 3 6 3 5 4 2 2 1

4 5 6 3 2 6 3 2 5 7 7 4 3 3 6 1 8 6

3 2 3 4 1 # 6 5 9 2 4 8 8 2 9 3 4 9

4 # 8 8 8 7 5 7 6 6 4 9 2 9 1 4 2 5

5 8 1 9 4 3 8 4 4 1 1 7 9 2 4 3 4 6

5 4 8 6 3 2 6 8 2 7 6 9 4 9 4 8 # 6

7 S 5 8 3 8 2 2 5 9 9 8 1 8 7 1 1 8

Heuristic 1

Time elapsed: 4.65625

Score: 415

Number of moves made: 19

Nodes expanded: 2721

Branching factor: 1.5162652658843017

Action Progression:

Start, Forward, Jump, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Turn Right, Forward

Heuristic 2

Time elapsed: 3.59375

Score: 415

Number of moves made: 23

Nodes expanded: 2365

Branching factor: 1.4018072786515932

Action Progression:

Start, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Turn Right, Forward

Heuristic 3

Time elapsed: 1.375

Score: 415

Number of moves made: 19

Nodes expanded: 1433

Branching factor: 1.4659468362427932

Action Progression:

Start, Forward, Jump, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Turn Right, Forward

Heuristic 4

Time elapsed: 0.78125

Score: 415

Number of moves made: 19

Nodes expanded: 1068

Branching factor: 1.4434391719807522

Action Progression:

Start, Forward, Jump, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Turn Right, Forward

Heuristic 5

Time elapsed: 0.6875

Score: 415

Number of moves made: 19

Nodes expanded: 1016

Branching factor: 1.4396521281707542

Action Progression:

Start, Forward, Jump, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Turn Right, Forward

Heuristic 6

Time elapsed: 0.046875

Score: 415

Number of moves made: 19

Nodes expanded: 210

Branching factor: 1.3250188849684925

Action Progression:

Start, Forward, Jump, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Turn Right, Forward

Map 2: jumpToGoal

# 2 # # 2 8 # # 8

S # 8 2 9 7 8 7 3

7 4 9 5 6 8 4 9 4

3 5 2 2 7 2 2 7 9

6 3 8 5 2 # # 6 2

1 9 # 5 # 1 6 # 7

# 7 2 9 3 # # # 1

6 6 3 1 9 # **G** # 5

8 9 6 2 1 # # # 8

5 2 2 # 2 4 1 # 3

3 8 # 8 6 8 1 5 9

7 1 3 8 7 9 4 2 7

5 8 3 2 2 # 6 3 2

6 5 7 8 1 7 2 2 5

4 9 2 5 5 # 8 3 4

3 3 5 3 2 # 2 2 4

8 6 4 4 # 1 5 3 9

Heuristic 1

Time elapsed: 0.03125

Score: 437

Number of moves made: 16

Nodes expanded: 291

Branching factor: 1.4255856392391402

Action Progression:

Start, Turn Right, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Jump

Heuristic 2

Time elapsed: 0.0625

Score: 437

Number of moves made: 16

Nodes expanded: 265

Branching factor: 1.4172708902798752

Action Progression:

Start, Turn Right, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Jump

Heuristic 3

Time elapsed: 0.046875

Score: 437

Number of moves made: 16

Nodes expanded: 250

Branching factor: 1.4121188506346776

Action Progression:

Start, Turn Right, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Jump

Heuristic 4

Time elapsed: 0.046875

Score: 437

Number of moves made: 16

Nodes expanded: 203

Branching factor: 1.3938579047670017

Action Progression:

Start, Turn Right, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Jump

Heuristic 5

Time elapsed: 0.03125

Score: 437

Number of moves made: 16

Nodes expanded: 191

Branching factor: 1.3885597921637223

Action Progression:

Start, Turn Right, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Jump

Heuristic 6

Time elapsed: 0.0

Score: 437

Number of moves made: 16

Nodes expanded: 88

Branching factor: 1.3229095969052957

Action Progression:

Start, Turn Right, Turn Right, Forward, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Jump

Map 3: weBuiltAWall

1 5 6 6 # # 4 5 1 8 4 2 3 **G** 7

7 4 9 3 # # 9 3 9 6 # 3 2 8 5

9 1 6 # # # 8 # 5 2 6 2 3 5 4

# 6 6 2 # # 6 2 4 7 3 3 2 4 6

8 # 8 # # # 8 6 9 3 7 1 3 5 8

3 6 8 2 # # 7 2 3 4 9 2 1 9 3

2 3 4 8 # # 2 9 2 9 2 2 3 # 6

6 6 2 1 # # 2 8 4 5 1 7 # 4 #

6 2 4 6 # # 3 2 1 4 # 9 8 2 1

4 7 8 4 # # 7 2 6 4 6 6 3 # #

# 3 # 1 # # 7 6 7 2 # 8 3 6 1

1 1 6 5 # # 9 2 5 6 9 3 9 1 8

1 8 5 # # # 8 9 7 7 6 6 7 9 3

1 2 # 5 # # 1 1 2 8 2 9 4 # #

9 4 4 8 9 4 1 4 4 6 7 3 # 2 9

1 7 5 7 # # 8 5 9 7 8 2 9 8 1

2 4 4 1 # # 2 4 7 1 # 3 # # 1

3 1 6 1 # # 7 3 6 3 3 # # 8 3

# 3 2 5 # # 5 8 9 8 9 9 4 3 #

7 S 8 8 2 5 3 7 2 9 2 3 9 1 5

6 3 2 1 7 8 9 6 2 7 1 9 8 9 2

Heuristic 1

Time elapsed: 8.8125

Score: 389

Number of moves made: 43

Nodes expanded: 3750

Branching factor: 1.210924332956208

Action Progression:

Start, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Jump, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward

Heuristic 2

Time elapsed: 2.703125

Score: 389

Number of moves made: 43

Nodes expanded: 2039

Branching factor: 1.1938869120873277

Action Progression:

Start, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Jump, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward

Heuristic 3

Time elapsed: 2.390625

Score: 389

Number of moves made: 43

Nodes expanded: 1995

Branching factor: 1.1932813640853872

Action Progression:

Start, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Jump, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward

Heuristic 4

Time elapsed: 1.328125

Score: 389

Number of moves made: 43

Nodes expanded: 1418

Branching factor: 1.1838448686952454

Action Progression:

Start, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Jump, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward

Heuristic 5

Time elapsed: 1.21875

Score: 389

Number of moves made: 43

Nodes expanded: 1396

Branching factor: 1.183414456258385

Action Progression:

Start, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Jump, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward

Heuristic 6

Time elapsed: 0.0625

Score: 387

Number of moves made: 39

Nodes expanded: 288

Branching factor: 1.1562755592243352

Action Progression:

Start, Forward, Forward, Turn Right, Forward, Forward, Jump, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward

Map 4: xLarge

4 # 1 2 9 6 5 3 4 1 7 5 9 4 6

4 8 5 7 3 2 4 # 7 1 5 6 8 3 8

4 6 3 8 7 9 2 8 1 1 1 4 8 9 3

1 5 3 6 9 # 1 5 # 6 4 3 2 5 2

1 S 2 # 3 5 3 4 # 2 9 4 5 8 1

4 2 8 7 3 4 5 9 6 3 9 5 1 4 2

3 # 7 5 2 # 6 7 5 8 7 6 2 2 9

# 9 2 8 2 1 9 9 3 6 7 5 # 8 7

2 2 9 4 6 2 6 5 4 1 3 1 3 8 7

# 4 4 4 4 5 3 4 2 7 1 9 5 5 5

2 4 5 # 1 7 2 2 7 9 1 # 2 1 5

# 1 8 4 2 3 6 9 5 6 3 1 2 1 1

# 9 6 2 6 # 2 # 5 3 2 5 3 7 3

9 5 5 3 2 7 4 6 8 7 1 6 7 9 7

9 3 4 4 7 4 9 8 7 4 7 3 5 2 2

4 # 7 4 3 6 8 4 2 6 9 6 3 5 2

# 6 1 5 6 # 8 7 3 5 7 9 7 1 9

4 4 8 1 2 # 5 3 3 # 9 2 # 3 8

4 3 4 1 4 7 3 1 9 7 9 7 6 2 3

5 1 3 2 4 6 1 3 8 3 4 8 7 6 3

4 9 2 1 2 6 7 8 8 6 6 1 7 8 6

4 # # 3 9 6 7 5 2 # # **G** 4 3 4

7 7 3 # 7 6 7 2 3 7 3 # 2 7 6

7 8 6 1 # 5 6 6 9 2 8 5 6 7 1

2 5 3 9 2 4 6 2 6 9 8 6 8 6 8

6 9 6 # 7 7 3 3 1 3 8 6 6 5 8

1 9 4 7 # 2 7 5 6 4 3 4 3 4 3

Heuristic 1

Score: 393

Number of moves made: 38

Nodes expanded: 3613

Branching factor: 1.2405895090079497

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward

Heuristic 2

Time elapsed: 5.328125

Score: 393

Number of moves made: 38

Nodes expanded: 2887

Branching factor: 1.2332876684653515

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward

Heuristic 3

Time elapsed: 5.046875

Score: 393

Number of moves made: 38

Nodes expanded: 2894

Branching factor: 1.2333662679882353

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward

Heuristic 4

Time elapsed: 3.359375

Score: 393

Number of moves made: 38

Nodes expanded: 2412

Branching factor: 1.227467293755038

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward

Heuristic 5

Time elapsed: 3.21875

Score: 393

Number of moves made: 38

Nodes expanded: 2319

Branching factor: 1.2261978378915395

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward

Heuristic 6

Time elapsed: 0.09375

Score: 393

Number of moves made: 38

Nodes expanded: 311

Branching factor: 1.1630515317677188

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Turn Right, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Forward, Forward, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Forward

Map 5: bigPit

5 S # # # **G** 4 0 8 3 5

2 2 # # # 6 0 8 7 9 1

# # # # # 3 9 7 2 7 9

0 3 # # # # 6 # 8 3 4

9 # # # # 3 # # 3 6 4

4 7 # # # # # # 3 8 5

1 6 2 # # # # # 8 2 0

9 1 2 # # # # # # 6 1

5 5 9 # # # # # 1 6 4

8 7 7 # # # # # 1 8 2

5 8 4 # # # # # 1 0 9

7 # 4 # # # # # # 0 3

6 1 2 7 0 # # # # 4 9

4 3 6 3 2 # # # # 3 3

6 7 7 4 2 # # # # 2 #

6 8 7 1 6 # # # # 8 6

0 0 0 6 # # # # # # 7

3 3 5 0 # # # # # 8 0

# 5 9 4 5 # # # # 6 6

7 7 0 # 3 2 8 5 8 5 4

8 7 2 3 0 # 8 5 6 7 2

6 1 7 9 5 6 4 8 7 8 2

3 8 4 9 5 9 1 0 2 0 #

Heuristic 1

Time elapsed: 1.625

Score: 266

Number of moves made: 58

Nodes expanded: 1555

Branching factor: 1.1350887892484753

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Right, Forward, Turn Left, Jump, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Jump, Forward, Turn Left, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Forward

Heuristic 2

Time elapsed: 1.453125

Score: 266

Number of moves made: 58

Nodes expanded: 1454

Branching factor: 1.1337752507732752

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Right, Forward, Turn Left, Jump, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Jump, Forward, Turn Left, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Forward

Heuristic 3

Time elapsed: 2.140625

Score: 266

Number of moves made: 58

Nodes expanded: 1826

Branching factor: 1.1382371915735479

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Right, Forward, Turn Left, Jump, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Jump, Forward, Turn Left, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Forward

Heuristic 4

Time elapsed: 1.890625

Score: 266

Number of moves made: 60

Nodes expanded: 1713

Branching factor: 1.1321291065181485

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Right, Forward, Turn Left, Jump, Forward, Forward, Turn Left, Forward, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Jump, Forward, Turn Left, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Forward

Heuristic 5

Time elapsed: 1.8125

Score: 266

Number of moves made: 58

Nodes expanded: 1686

Branching factor: 1.136672820090594

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Right, Forward, Turn Left, Jump, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Jump, Forward, Turn Left, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Forward

Heuristic 6

Time elapsed: 2.296875

Score: 266

Number of moves made: 58

Nodes expanded: 1999

Branching factor: 1.140014999254174

Action Progression:

Start, Turn Right, Turn Right, Forward, Turn Right, Forward, Turn Left, Jump, Forward, Forward, Turn Left, Forward, Forward, Turn Right, Forward, Jump, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Turn Left, Forward, Jump, Forward, Turn Left, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Turn Right, Forward, Forward, Jump, Forward, Forward, Forward, Forward, Forward, Turn Left, Forward, Forward, Forward