Example traces:

BFS:

Enter the x and y coordinates of the source

1 1

Enter the x and y coordinates of the destination

4 4

Enter the search algorithm you want to find the path using

1.bfs 2.dfs 3.gbfs

1

element pushed:1,1

popped = 0 (1,1) depth=0 distance to goal=0

element pushed:1,2 element pushed:2,1 element pushed:2,2

popped = 1 (1,2) depth=1 distance to goal=3.60555

element pushed:1,3 element pushed:2,3

popped = 20 (2,1) depth=1 distance to goal=3.60555

element pushed:3,1 element pushed:3,2

popped = 21 (2,2) depth=1 distance to goal=2.82843

element pushed:3,3

popped = 2 (1,3) depth=2 distance to goal=3.16228

element pushed:1,4 element pushed:2,4

popped = 22 (2,3) depth=2 distance to goal=2.23607

element pushed:3,4

popped = 40 (3,1) depth=2 distance to goal=3.16228

element pushed:4,1 element pushed:4,2

popped = 41 (3,2) depth=2 distance to goal=2.23607

element pushed:4,3

popped = 42 (3,3) depth=2 distance to goal=1.41421

element pushed:4,4

popped = 3 (1,4) depth=3 distance to goal=3

element pushed:1,5 element pushed:2,5

popped = 23 (2,4) depth=3 distance to goal=2

element pushed:3,5

popped = 43 (3,4) depth=3 distance to goal=1

element pushed:4,5

popped = 59 (4,1) depth=3 distance to goal=3

element pushed:5,1 element pushed:5,2

popped = 60 (4,2) depth=3 distance to goal=2

element pushed:5,3

popped = 61 (4,3) depth=3 distance to goal=1

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PATH from 0 to 62 :

vertex 0 ( 1 , 1 )

vertex 21 ( 2 , 2 )

vertex 42 ( 3 , 3 )

vertex 62 ( 4 , 4 )

search algorithm is bfs

Time complexity measured by goal tests= 16

Space complexity measured by max frontier size= 9

Depth of the path= 3

DFS

Enter the x and y coordinates of the source

1 3

Enter the x and y coordinates of the destination

5 2

Enter the search algorithm you want to find the path using

1.bfs 2.dfs 3.gbfs

2

element pushed:1,3

popped = 2 (1,3) depth=0 distance to goal=0

element pushed:1,4 element pushed:1,2 element pushed:2,3 element pushed:2,4

popped = 23 (2,4) depth=1 distance to goal=3.60555

element pushed:2,5 element pushed:3,4 element pushed:3,5

popped = 44 (3,5) depth=2 distance to goal=3.60555

element pushed:3,6 element pushed:4,5 element pushed:4,6

popped = 64 (4,6) depth=3 distance to goal=4.12311

element pushed:4,7

popped = 65 (4,7) depth=4 distance to goal=5.09902

element pushed:4,8 element pushed:3,7

popped = 46 (3,7) depth=5 distance to goal=5.38516

element pushed:3,8 element pushed:2,7 element pushed:2,6

popped = 25 (2,6) depth=6 distance to goal=5

element pushed:1,6 element pushed:1,5

popped = 4 (1,5) depth=7 distance to goal=5

popped = 5 (1,6) depth=7 distance to goal=5.65685

element pushed:1,7

popped = 6 (1,7) depth=8 distance to goal=6.40312

element pushed:1,8 element pushed:2,8

popped = 27 (2,8) depth=9 distance to goal=6.7082

element pushed:2,9 element pushed:3,9

popped = 48 (3,9) depth=10 distance to goal=7.28011

element pushed:3,10 element pushed:4,9 element pushed:4,10

popped = 68 (4,10) depth=11 distance to goal=8.06226

element pushed:3,11 element pushed:3,12 element pushed:3,13

popped = 52 (3,13) depth=12 distance to goal=11.1803

element pushed:2,13 element pushed:2,12

popped = 31 (2,12) depth=13 distance to goal=10.4403

element pushed:2,11 element pushed:1,12 element pushed:1,11

popped = 10 (1,11) depth=14 distance to goal=9.84886

element pushed:1,10

popped = 9 (1,10) depth=15 distance to goal=8.94427

element pushed:1,9 element pushed:2,10

popped = 29 (2,10) depth=16 distance to goal=8.544

popped = 8 (1,9) depth=16 distance to goal=8.06226

popped = 11 (1,12) depth=14 distance to goal=10.7703

element pushed:1,13

popped = 12 (1,13) depth=15 distance to goal=11.7047

element pushed:1,14 element pushed:2,14

popped = 33 (2,14) depth=16 distance to goal=12.3693

element pushed:2,15 element pushed:3,15

popped = 53 (3,15) depth=17 distance to goal=13.1529

element pushed:3,16 element pushed:4,15 element pushed:4,16

popped = 70 (4,16) depth=18 distance to goal=14.0357

element pushed:4,17 element pushed:5,16 element pushed:5,17

popped = 83 (5,17) depth=19 distance to goal=15

element pushed:5,18 element pushed:6,17 element pushed:6,18

popped = 96 (6,18) depth=20 distance to goal=16.0312

element pushed:6,19 element pushed:7,18 element pushed:7,19

popped = 111 (7,19) depth=21 distance to goal=17.1172

element pushed:7,20 element pushed:8,19 element pushed:8,20

popped = 129 (8,20) depth=22 distance to goal=18.2483

element pushed:9,20

popped = 144 (9,20) depth=23 distance to goal=18.4391

element pushed:9,19 element pushed:10,20

popped = 149 (10,20) depth=24 distance to goal=18.6815

element pushed:10,19 element pushed:11,20

popped = 154 (11,20) depth=25 distance to goal=18.9737

element pushed:11,19 element pushed:12,20

popped = 159 (12,20) depth=26 distance to goal=19.3132

element pushed:12,19 element pushed:13,20

popped = 172 (13,20) depth=27 distance to goal=19.6977

element pushed:13,19 element pushed:14,20

popped = 184 (14,20) depth=28 distance to goal=20.1246

element pushed:14,19 element pushed:15,20

popped = 197 (15,20) depth=29 distance to goal=20.5913

element pushed:15,19 element pushed:16,20

popped = 210 (16,20) depth=30 distance to goal=21.095

element pushed:16,19 element pushed:17,20

popped = 222 (17,20) depth=31 distance to goal=21.6333

element pushed:17,19 element pushed:18,20

popped = 236 (18,20) depth=32 distance to goal=22.2036

element pushed:18,19 element pushed:19,20

popped = 254 (19,20) depth=33 distance to goal=22.8035

element pushed:19,19 element pushed:20,20

popped = 274 (20,20) depth=34 distance to goal=23.4307

element pushed:20,19

popped = 273 (20,19) depth=35 distance to goal=22.6716

element pushed:20,18 element pushed:19,18

popped = 252 (19,18) depth=36 distance to goal=21.2603

element pushed:19,17 element pushed:18,18 element pushed:18,17

popped = 233 (18,17) depth=37 distance to goal=19.8494

element pushed:18,16 element pushed:17,17 element pushed:17,16

popped = 218 (17,16) depth=38 distance to goal=18.4391

element pushed:17,15 element pushed:16,16 element pushed:16,15

popped = 205 (16,15) depth=39 distance to goal=17.0294

element pushed:16,14 element pushed:15,15 element pushed:15,14

popped = 191 (15,14) depth=40 distance to goal=15.6205

element pushed:15,13

popped = 190 (15,13) depth=41 distance to goal=14.8661

element pushed:15,12

popped = 189 (15,12) depth=42 distance to goal=14.1421

popped = 192 (15,15) depth=40 distance to goal=16.4012

element pushed:15,16 element pushed:14,15

popped = 179 (14,15) depth=41 distance to goal=15.8114

element pushed:14,16 element pushed:13,15

popped = 170 (13,15) depth=42 distance to goal=15.2643

popped = 180 (14,16) depth=42 distance to goal=16.6433

element pushed:14,17 element pushed:15,17

popped = 194 (15,17) depth=43 distance to goal=18.0278

element pushed:15,18 element pushed:16,17 element pushed:16,18

popped = 208 (16,18) depth=44 distance to goal=19.4165

element pushed:17,18

popped = 220 (17,18) depth=45 distance to goal=20

popped = 207 (16,17) depth=44 distance to goal=18.6011

popped = 195 (15,18) depth=44 distance to goal=18.868

element pushed:14,18

popped = 182 (14,18) depth=45 distance to goal=18.3576

popped = 181 (14,17) depth=43 distance to goal=17.4929

popped = 193 (15,16) depth=41 distance to goal=17.2047

popped = 204 (16,14) depth=40 distance to goal=16.2788

element pushed:17,13 element pushed:17,12 element pushed:18,15

popped = 231 (18,15) depth=41 distance to goal=18.3848

element pushed:19,15 element pushed:19,16 element pushed:20,14

popped = 268 (20,14) depth=42 distance to goal=19.2094

element pushed:20,15 element pushed:20,13 element pushed:19,13

popped = 248 (19,13) depth=43 distance to goal=17.8045

element pushed:19,12

popped = 247 (19,12) depth=44 distance to goal=17.2047

element pushed:19,11 element pushed:20,12

popped = 266 (20,12) depth=45 distance to goal=18.0278

element pushed:20,11

popped = 265 (20,11) depth=46 distance to goal=17.4929

element pushed:20,10 element pushed:19,10

popped = 245 (19,10) depth=47 distance to goal=16.1245

element pushed:20,9

popped = 263 (20,9) depth=48 distance to goal=16.5529

element pushed:20,8 element pushed:19,8

popped = 244 (19,8) depth=49 distance to goal=15.2315

element pushed:19,7 element pushed:18,8 element pushed:18,7

popped = 229 (18,7) depth=50 distance to goal=13.9284

element pushed:18,6 element pushed:17,8

popped = 214 (17,8) depth=51 distance to goal=13.4164

element pushed:16,8 element pushed:16,9 element pushed:16,10 element pushed:18,5

popped = 227 (18,5) depth=52 distance to goal=13.3417

element pushed:18,4 element pushed:19,5 element pushed:19,6 element pushed:17,3

popped = 213 (17,3) depth=53 distance to goal=12.0416

element pushed:17,2 element pushed:16,3 element pushed:18,3 element pushed:16,2

popped = 199 (16,2) depth=54 distance to goal=11

element pushed:16,1 element pushed:15,2 element pushed:15,1

popped = 185 (15,1) depth=55 distance to goal=10.0499

element pushed:14,1

popped = 173 (14,1) depth=56 distance to goal=9.05539

element pushed:14,2 element pushed:13,1

popped = 160 (13,1) depth=57 distance to goal=8.06226

element pushed:13,2 element pushed:12,1

popped = 155 (12,1) depth=58 distance to goal=7.07107

element pushed:12,2 element pushed:11,1

popped = 150 (11,1) depth=59 distance to goal=6.08276

element pushed:11,2 element pushed:10,1

popped = 145 (10,1) depth=60 distance to goal=5.09902

element pushed:10,2 element pushed:9,1

popped = 130 (9,1) depth=61 distance to goal=4.12311

element pushed:9,2 element pushed:8,1

popped = 113 (8,1) depth=62 distance to goal=3.16228

element pushed:8,2 element pushed:7,1

popped = 99 (7,1) depth=63 distance to goal=2.23607

element pushed:7,2 element pushed:6,1

popped = 87 (6,1) depth=64 distance to goal=1.41421

element pushed:6,2 element pushed:5,1

popped = 75 (5,1) depth=65 distance to goal=1

element pushed:5,2 element pushed:4,1

popped = 59 (4,1) depth=66 distance to goal=1.41421

element pushed:4,2 element pushed:3,1

popped = 40 (3,1) depth=67 distance to goal=2.23607

element pushed:3,2 element pushed:2,1

popped = 20 (2,1) depth=68 distance to goal=3.16228

element pushed:2,2 element pushed:1,1

popped = 0 (1,1) depth=69 distance to goal=4.12311

popped = 21 (2,2) depth=69 distance to goal=3

element pushed:3,3

popped = 42 (3,3) depth=70 distance to goal=2.23607

element pushed:4,3 element pushed:4,4

popped = 62 (4,4) depth=71 distance to goal=2.23607

popped = 61 (4,3) depth=71 distance to goal=1.41421

element pushed:5,3

popped = 77 (5,3) depth=72 distance to goal=1

element pushed:6,3

popped = 89 (6,3) depth=73 distance to goal=1.41421

element pushed:7,3

popped = 101 (7,3) depth=74 distance to goal=2.23607

element pushed:8,3

popped = 115 (8,3) depth=75 distance to goal=3.16228

element pushed:9,3

popped = 132 (9,3) depth=76 distance to goal=4.12311

element pushed:10,3

popped = 147 (10,3) depth=77 distance to goal=5.09902

element pushed:11,3

popped = 152 (11,3) depth=78 distance to goal=6.08276

element pushed:12,3

popped = 157 (12,3) depth=79 distance to goal=7.07107

element pushed:13,3

popped = 162 (13,3) depth=80 distance to goal=8.06226

element pushed:14,3

popped = 175 (14,3) depth=81 distance to goal=9.05539

element pushed:15,3

popped = 187 (15,3) depth=82 distance to goal=10.0499

popped = 41 (3,2) depth=68 distance to goal=2

popped = 60 (4,2) depth=67 distance to goal=1

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PATH from 2 to 76 :

vertex 2 ( 1 , 3 )

vertex 23 ( 2 , 4 )

vertex 44 ( 3 , 5 )

vertex 64 ( 4 , 6 )

vertex 65 ( 4 , 7 )

vertex 46 ( 3 , 7 )

vertex 25 ( 2 , 6 )

vertex 5 ( 1 , 6 )

vertex 6 ( 1 , 7 )

vertex 27 ( 2 , 8 )

vertex 48 ( 3 , 9 )

vertex 68 ( 4 , 10 )

vertex 52 ( 3 , 13 )

vertex 31 ( 2 , 12 )

vertex 11 ( 1 , 12 )

vertex 12 ( 1 , 13 )

vertex 33 ( 2 , 14 )

vertex 53 ( 3 , 15 )

vertex 70 ( 4 , 16 )

vertex 83 ( 5 , 17 )

vertex 96 ( 6 , 18 )

vertex 111 ( 7 , 19 )

vertex 129 ( 8 , 20 )

vertex 144 ( 9 , 20 )

vertex 149 ( 10 , 20 )

vertex 154 ( 11 , 20 )

vertex 159 ( 12 , 20 )

vertex 172 ( 13 , 20 )

vertex 184 ( 14 , 20 )

vertex 197 ( 15 , 20 )

vertex 210 ( 16 , 20 )

vertex 222 ( 17 , 20 )

vertex 236 ( 18 , 20 )

vertex 254 ( 19 , 20 )

vertex 274 ( 20 , 20 )

vertex 273 ( 20 , 19 )

vertex 252 ( 19 , 18 )

vertex 233 ( 18 , 17 )

vertex 218 ( 17 , 16 )

vertex 205 ( 16 , 15 )

vertex 204 ( 16 , 14 )

vertex 231 ( 18 , 15 )

vertex 268 ( 20 , 14 )

vertex 248 ( 19 , 13 )

vertex 247 ( 19 , 12 )

vertex 266 ( 20 , 12 )

vertex 265 ( 20 , 11 )

vertex 245 ( 19 , 10 )

vertex 263 ( 20 , 9 )

vertex 244 ( 19 , 8 )

vertex 229 ( 18 , 7 )

vertex 214 ( 17 , 8 )

vertex 227 ( 18 , 5 )

vertex 213 ( 17 , 3 )

vertex 199 ( 16 , 2 )

vertex 185 ( 15 , 1 )

vertex 173 ( 14 , 1 )

vertex 160 ( 13 , 1 )

vertex 155 ( 12 , 1 )

vertex 150 ( 11 , 1 )

vertex 145 ( 10 , 1 )

vertex 130 ( 9 , 1 )

vertex 113 ( 8 , 1 )

vertex 99 ( 7 , 1 )

vertex 87 ( 6 , 1 )

vertex 75 ( 5 , 1 )

vertex 76 ( 5 , 2 )

search algorithm is dfs

Time complexity measured by goal tests= 108

Space complexity measured by max frontier size= 85

Depth of the path= 66

GBFS:

Enter the x and y coordinates of the source

1 3

Enter the x and y coordinates of the destination

5 2

Enter the search algorithm you want to find the path using

1.bfs 2.dfs 3.gbfs

3

element pushed:1,3

popped = 2 (1,3) depth=0 distance to goal=0

element pushed:1,4 element pushed:1,2 element pushed:2,3 element pushed:2,4

popped = 22 (2,3) depth=1 distance to goal=3.16228

element pushed:2,2 element pushed:3,3 element pushed:3,4

popped = 42 (3,3) depth=2 distance to goal=2.23607

element pushed:3,2 element pushed:4,3 element pushed:4,4

popped = 61 (4,3) depth=3 distance to goal=1.41421

element pushed:4,2 element pushed:5,3

popped = 60 (4,2) depth=4 distance to goal=1

element pushed:4,1 element pushed:5,2 element pushed:3,1

===============================

PATH from 2 to 76 :

vertex 2 ( 1 , 3 )

vertex 22 ( 2 , 3 )

vertex 42 ( 3 , 3 )

vertex 61 ( 4 , 3 )

vertex 60 ( 4 , 2 )

vertex 76 ( 5 , 2 )

search algorithm is gbfs

Time complexity measured by goal tests= 6

Space complexity measured by max frontier size= 11

Depth of the path= 5