

```

1 /Library/Frameworks/Python.framework/Versions/2.7/bin/
  python2.7 /Users/jianili/Documents/github/Advanced_AI/
  Homework2_HexGame/main.py
2 player1 move = [3, 3]
3 time used for this move:0.012125
4 ■■■■■■
5 □ . . . . □
6 □ . . . . □
7   □ . . . . □
8     □ . . . . □
9       □ . . . . □
10        □ . . . . □
11         □ . . . . □
12          □ . . . . □
13           ■■■■■■
14
15 -1's turn to place a ○ piece
16 player2 move = (4, 3)
17 time used for this move:0.085615
18 ■■■■■■
19 □ . . . . □
20 □ . . . . □
21   □ . . . . □
22     □ . . . . □
23       □ . . . . □
24        □ . . . . □
25         □ . . . . □
26          □ . . . . □
27           ■■■■■■
28
29 1's turn to place a ● piece
30 the number of simulations performed: 3072
31 the max size of the search tree for all moves 3072
32 Best Child Value: 20
33 Best Child Visits: 116
34 player1 move = (7, 2)
35 time used for this move:60.037671
36 ■■■■■■
37 □ . . . . □
38 □ . . . . □
39   □ . . . . □
40     □ . . . . □
41       □ . . . . □
42        □ . . . . □
43         □ . . . . □
44          □ . . . . □
45           ■■■■■■
46
47 -1's turn to place a ○ piece
48 player2 move = (4, 4)

```

49 time used for this move:1.519255

50 ■■■■■■

51 □ . . . . . □

52 □ . . . . . □

53 □ . . . . . □

54 □ . . . . ● . . . . □

55 □ . . . . ○ ○ . . . . □

56 □ . . . . . □

57 □ . . . . . □

58 □ . . . ● . . . . □

59 ▣■■■■■

60

61 1's turn to place a ● piece

62 the number of simulations performed: 2970

63 the max size of the search tree for all moves 2970

64 Best Child Value: 2

65 Best Child Visits: 108

66 player1 move = (0, 4)

67 time used for this move:60.022952

68 ■■■■■■

69 □ . . . . ● . . . . □

70 □ . . . . . □

71 □ . . . . . □

72 □ . . . . ● . . . . □

73 □ . . . . ○ ○ . . . . □

74 □ . . . . . □

75 □ . . . . . □

76 □ . . . ● . . . . □

77 ▣■■■■■

78

79 -1's turn to place a ○ piece

80 player2 move = (4, 2)

81 time used for this move:1.539151

82 ■■■■■■

83 □ . . . . ● . . . . □

84 □ . . . . . □

85 □ . . . . . □

86 □ . . . . ● . . . . □

87 □ . . . . ○ ○ ○ . . . . □

88 □ . . . . . □

89 □ . . . . . □

90 □ . . . ● . . . . □

91 ▣■■■■■

92

93 1's turn to place a ● piece

94 the number of simulations performed: 2998

95 the max size of the search tree for all moves 2998

96 Best Child Value: -13

97 Best Child Visits: 131

98 player1 move = (5, 5)

```

99 time used for this move:60.036721
100 ■■■■■■
101 □ . . . . ● . . . □
102 □ . . . . . . . □
103 □ . . . . . . . □
104 □ . . . ● . . . . □
105 □ . . ○ ○ ○ . . . □
106 □ . . . . . ● . . □
107 □ . . . . . . . □
108 □ . . ● . . . . . □
109 ■■■■■■
110
111 -1's turn to place a ○ piece
112 player2 move = (4, 5)
113 time used for this move:0.398979
114 ■■■■■■
115 □ . . . . ● . . . □
116 □ . . . . . . . □
117 □ . . . . . . . □
118 □ . . . ● . . . . □
119 □ . . ○ ○ ○ ○ . . □
120 □ . . . . . ● . . □
121 □ . . . . . . . □
122 □ . . ● . . . . . □
123 ■■■■■■
124
125 1's turn to place a ● piece
126 the number of simulations performed: 2910
127 the max size of the search tree for all moves 2910
128 Best Child Value: -35
129 Best Child Visits: 215
130 player1 move = (4, 6)
131 time used for this move:60.027087
132 ■■■■■■
133 □ . . . . ● . . . □
134 □ . . . . . . . □
135 □ . . . . . . . □
136 □ . . . ● . . . . □
137 □ . . ○ ○ ○ ○ ● . □
138 □ . . . . . ● . . □
139 □ . . . . . . . □
140 □ . . ● . . . . . □
141 ■■■■■■
142
143 -1's turn to place a ○ piece
144 player2 move = (3, 6)
145 time used for this move:0.356124
146 ■■■■■■
147 □ . . . . ● . . . □
148 □ . . . . . . . □

```

```

149  □ . . . . . □
150  □ . . . ● . . ○ . □
151  □ . . ○ ○ ○ ○ ● . □
152  □ . . . . . ● . . □
153  □ . . . . . . . □
154  □ . . ● . . . . □
155  ▣ ■ ■ ■ ■ ■ ■ ■ ■
156
157  1's turn to place a ● piece
158  the number of simulations performed: 2887
159  the max size of the search tree for all moves 2887
160  Best Child Value: -43
161  Best Child Visits: 135
162  player1 move = (4, 1)
163  time used for this move:60.021748
164  ■ ■ ■ ■ ■ ■ ■ ■ ▣
165  □ . . . . ● . . . □
166  □ . . . . . . . . □
167  □ . . . . . . . . □
168  □ . . . ● . . ○ . □
169  □ . ● ○ ○ ○ ○ ● . □
170  □ . . . . . ● . . □
171  □ . . . . . . . . □
172  □ . . ● . . . . . □
173  ▣ ■ ■ ■ ■ ■ ■ ■ ■
174
175  -1's turn to place a ○ piece
176  player2 move = (3, 7)
177  time used for this move:0.702932
178  ■ ■ ■ ■ ■ ■ ■ ■ ▣
179  □ . . . . ● . . . □
180  □ . . . . . . . . □
181  □ . . . . . . . . □
182  □ . . . ● . . ○ ○ □
183  □ . ● ○ ○ ○ ○ ● . □
184  □ . . . . . ● . . □
185  □ . . . . . . . . □
186  □ . . ● . . . . . □
187  ▣ ■ ■ ■ ■ ■ ■ ■ ■
188
189  1's turn to place a ● piece
190  the number of simulations performed: 2908
191  the max size of the search tree for all moves 2908
192  Best Child Value: -57
193  Best Child Visits: 259
194  player1 move = (5, 1)
195  time used for this move:60.041565
196  ■ ■ ■ ■ ■ ■ ■ ■ ▣
197  □ . . . . ● . . . □
198  □ . . . . . . . . □

```

```

199  □ . . . . . □
200  □ . . . ● . . ○ ○ □
201  □ . ● ○ ○ ○ ○ ● . □
202  □ . ● . . . ● . . □
203  □ . . . . . . . □
204  □ . . ● . . . . □
205  ▣ ■ ■ ■ ■ ■ ■ ■ ■
206
207 -1's turn to place a ○ piece
208 player2 move = (3, 2)
209 time used for this move:0.681521
210  ■ ■ ■ ■ ■ ■ ■ ■ ▣
211  □ . . . . ● . . . □
212  □ . . . . . . . . □
213  □ . . . . . . . . □
214  □ . . ○ ● . . ○ ○ □
215  □ . ● ○ ○ ○ ○ ● . □
216  □ . ● . . . ● . . □
217  □ . . . . . . . . □
218  □ . . ● . . . . . □
219  ▣ ■ ■ ■ ■ ■ ■ ■ ■
220
221 1's turn to place a ● piece
222 the number of simulations performed: 2923
223 the max size of the search tree for all moves 2923
224 Best Child Value: -51
225 Best Child Visits: 433
226 player1 move = (3, 1)
227 time used for this move:60.024397
228  ■ ■ ■ ■ ■ ■ ■ ■ ▣
229  □ . . . . ● . . . □
230  □ . . . . . . . . □
231  □ . . . . . . . . □
232  □ . ● ○ ● . . ○ ○ □
233  □ . ● ○ ○ ○ ○ ● . □
234  □ . ● . . . ● . . □
235  □ . . . . . . . . □
236  □ . . ● . . . . . □
237  ▣ ■ ■ ■ ■ ■ ■ ■ ■
238
239 -1's turn to place a ○ piece
240 player2 move = (5, 2)
241 time used for this move:1.339359
242  ■ ■ ■ ■ ■ ■ ■ ■ ▣
243  □ . . . . ● . . . □
244  □ . . . . . . . . □
245  □ . . . . . . . . □
246  □ . ● ○ ● . . ○ ○ □
247  □ . ● ○ ○ ○ ○ ● . □
248  □ . ● ○ . . ● . . □

```

```

249      □ . . . . . □
250      □ . . ● . . . . □
251      ▣ ■ ■ ■ ■ ■ ■ ■ ■
252
253 1's turn to place a ● piece
254 2017-03-06 19:51:05.790 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_attributesForCharacterIndex:reply:)
    block performed very slowly (59.84 secs).
255 2017-03-06 19:51:05.791 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_windowLevelWithReply:) block performed
    very slowly (57.84 secs).
256 the number of simulations performed: 3064
257 the max size of the search tree for all moves 3060
258 Best Child Value: 37
259 Best Child Visits: 461
260 player1 move = (6, 1)
261 time used for this move:60.031954
262      ■ ■ ■ ■ ■ ■ ■ ■ ▣
263      □ . . . . ● . . . □
264      □ . . . . . . . . □
265      □ . . . . . . . . □
266      □ . ● ○ ● . . ○ ○ □
267      □ . ● ○ ○ ○ ○ ● . □
268      □ . ● ○ . . ● . . □
269      □ . ● . . . . . □
270      □ . . ● . . . . □
271      ▣ ■ ■ ■ ■ ■ ■ ■ ■
272
273 -1's turn to place a ○ piece
274 player2 move = (1, 2)
275 time used for this move:0.249801
276      ■ ■ ■ ■ ■ ■ ■ ■ ▣
277      □ . . . . ● . . . □
278      □ . . ○ . . . . . □
279      □ . . . . . . . . □
280      □ . ● ○ ● . . ○ ○ □
281      □ . ● ○ ○ ○ ○ ● . □
282      □ . ● ○ . . ● . . □
283      □ . ● . . . . . □
284      □ . . ● . . . . □
285      ▣ ■ ■ ■ ■ ■ ■ ■ ■
286
287 1's turn to place a ● piece
288 2017-03-06 19:52:23.207 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the

```

```

288 problem - (imkxpc_attributesForCharacterIndex:reply:)
    block performed very slowly (60.03 secs).
289 2017-03-06 19:52:23.208 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_windowLevelWithReply:) block performed
    very slowly (58.02 secs).
290 the number of simulations performed: 3183
291 the max size of the search tree for all moves 3183
292 Best Child Value: 81
293 Best Child Visits: 337
294 player1 move = (2, 2)
295 time used for this move:60.024541
296 ■■■■■■■■■■
297 □ . . . . ● . . . □
298 □ . . ○ . . . . □
299 □ . . ● . . . . □
300 □ . ● ○ ● . . ○ ○ □
301 □ . ● ○ ○ ○ ○ ● . □
302 □ . ● ○ . . ● . . □
303 □ . ● . . . . . □
304 □ . . ● . . . . □
305 ■■■■■■■■■■
306
307 -1's turn to place a ○ piece
308 player2 move = (1, 3)
309 time used for this move:0.126548
310 ■■■■■■■■■■
311 □ . . . . ● . . . □
312 □ . . ○ ○ . . . . □
313 □ . . ● . . . . □
314 □ . ● ○ ● . . ○ ○ □
315 □ . ● ○ ○ ○ ○ ● . □
316 □ . ● ○ . . ● . . □
317 □ . ● . . . . . □
318 □ . . ● . . . . □
319 ■■■■■■■■■■
320
321 1's turn to place a ● piece
322 the number of simulations performed: 3154
323 the max size of the search tree for all moves 3154
324 Best Child Value: 58
325 Best Child Visits: 280
326 player1 move = (2, 3)
327 time used for this move:60.031443
328 ■■■■■■■■■■
329 □ . . . . ● . . . □
330 □ . . ○ ○ . . . . □
331 □ . . ● ● . . . . □
332 □ . ● ○ ● . . ○ ○ □

```

```

333  □ . ● ○ ○ ○ ○ ● . □
334  □ . ● ○ . . ● . . □
335  □ . ● . . . . . □
336  □ . . ● . . . . □
337  ■ ■ ■ ■ ■ ■ ■ ■
338
339  -1's turn to place a ○ piece
340  2017-03-06 19:53:31.309 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_attributesForCharacterIndex:reply:)
    block performed very slowly (59.85 secs).
341  2017-03-06 19:53:31.309 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_windowLevelWithReply:) block performed
    very slowly (57.85 secs).
342  player2 move = (1, 4)
343  time used for this move:0.109007
344  ■ ■ ■ ■ ■ ■ ■ ■
345  □ . . . . ● . . . □
346  □ . . ○ ○ ○ . . . □
347  □ . . ● ● . . . . □
348  □ . ● ○ ● . . ○ ○ □
349  □ . ● ○ ○ ○ ○ ● . □
350  □ . ● ○ . . ● . . □
351  □ . ● . . . . . □
352  □ . . ● . . . . □
353  ■ ■ ■ ■ ■ ■ ■ ■
354
355  1's turn to place a ● piece
356  2017-03-06 19:54:38.428 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_attributesForCharacterIndex:reply:)
    block performed very slowly (60.13 secs).
357  2017-03-06 19:54:38.429 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_windowLevelWithReply:) block performed
    very slowly (58.13 secs).
358  the number of simulations performed: 3117
359  the max size of the search tree for all moves 3117
360  Best Child Value: 50
361  Best Child Visits: 226
362  player1 move = (2, 1)
363  time used for this move:60.037682
364  ■ ■ ■ ■ ■ ■ ■ ■
365  □ . . . . ● . . . □
366  □ . . ○ ○ ○ . . . □

```



```

367  □ . ● ● ● . . . . □
368  □ . ● ○ ● . . ○ ○ □
369  □ . ● ○ ○ ○ ○ ● . □
370  □ . ● ○ . . ● . . □
371  □ . ● . . . . . □
372  □ . . ● . . . . □
373  ■ ■ ■ ■ ■ ■ ■ ■ ■
374
375  -1's turn to place a ○ piece
376  player2 move = (2, 4)
377  time used for this move:0.334737
378  ■ ■ ■ ■ ■ ■ ■ ■ ■
379  □ . . . . ● . . . □
380  □ . . ○ ○ ○ . . . □
381  □ . ● ● ● ○ . . . □
382  □ . ● ○ ● . . ○ ○ □
383  □ . ● ○ ○ ○ ○ ● . □
384  □ . ● ○ . . ● . . □
385  □ . ● . . . . . □
386  □ . . ● . . . . □
387  ■ ■ ■ ■ ■ ■ ■ ■ ■
388
389  1's turn to place a ● piece
390  the number of simulations performed: 3288
391  the max size of the search tree for all moves 3140
392  Best Child Value: 551
393  Best Child Visits: 1143
394  player1 move = (1, 1)
395  time used for this move:60.014967
396  ■ ■ ■ ■ ■ ■ ■ ■ ■
397  □ . . . . ● . . . □
398  □ . ● ○ ○ ○ . . . □
399  □ . ● ● ● ○ . . . □
400  □ . ● ○ ● . . ○ ○ □
401  □ . ● ○ ○ ○ ○ ● . □
402  □ . ● ○ . . ● . . □
403  □ . ● . . . . . □
404  □ . . ● . . . . □
405  ■ ■ ■ ■ ■ ■ ■ ■ ■
406
407  -1's turn to place a ○ piece
408  2017-03-06 19:56:04.501 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_attributesForCharacterIndex:reply:)
    block performed very slowly (59.76 secs).
409  2017-03-06 19:56:04.501 Python[20978:2045421] IMKClient
    Stall detected, *please Report* your user scenario
    attaching a spindump (or sysdiagnose) that captures the
    problem - (imkxpc_windowLevelWithReply:) block performed

```

```

409 very slowly (57.76 secs).
410 player2 move = (0, 1)
411 time used for this move:1.246789
412 ■■■■■■■■
413 □ · ○ · · ● · · · □
414 □ · ● ○ ○ ○ · · · □
415 □ · ● ● ● ○ · · · □
416 □ · ● ○ ● · · ○ ○ □
417 □ · ● ○ ○ ○ ○ ● · □
418 □ · ● ○ · · ● · · □
419 □ · ● · · · · · □
420 □ · · ● · · · · · □
421 ■■■■■■■■
422
423 1's turn to place a ● piece
424 the number of simulations performed: 3299
425 the max size of the search tree for all moves 2948
426 Best Child Value: 1092
427 Best Child Visits: 1542
428 player1 move = (0, 2)
429 time used for this move:60.039547
430 ■■■■■■■■
431 □ · ○ ● · ● · · · □
432 □ · ● ○ ○ ○ · · · □
433 □ · ● ● ● ○ · · · □
434 □ · ● ○ ● · · ○ ○ □
435 □ · ● ○ ○ ○ ○ ● · □
436 □ · ● ○ · · ● · · □
437 □ · ● · · · · · □
438 □ · · ● · · · · · □
439 ■■■■■■■■
440
441 -1's turn to place a ○ piece
442 player2 move = (6, 2)
443 time used for this move:0.631288
444 ■■■■■■■■
445 □ · ○ ● · ● · · · □
446 □ · ● ○ ○ ○ · · · □
447 □ · ● ● ● ○ · · · □
448 □ · ● ○ ● · · ○ ○ □
449 □ · ● ○ ○ ○ ○ ● · □
450 □ · ● ○ · · ● · · □
451 □ · ● ○ · · · · · □
452 □ · · ● · · · · · □
453 ■■■■■■■■
454
455 1's turn to place a ● piece
456 player1 move = (7, 1)
457 time used for this move:0.024725
458 ■■■■■■■■

```

```
459  □ . ○ ● . ● . . . □
460  □ . ● ○ ○ ○ . . . □
461  □ . ● ● ● ○ . . . □
462  □ . ● ○ ● . . ○ ○ □
463  □ . ● ○ ○ ○ ○ ● . □
464  □ . ● ○ . . ● . . □
465  □ . ● ○ . . . . . □
466  □ . ● ● . . . . . □
467  □ ■ ■ ■ ■ ■ ■ ■ ■
468
469  1's turn to place a ● piece
470  1 wins
471
```