```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=22354
 3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   01 My Python Code', 'E:/1 0000/3 00000/1 000000/1 0000000/1 000000 0000/1 LW 00002/6 0000/2 python code/
   01_My_Python_Code'])
6
   PyDev console: starting.
   Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
 8
   □□□/2 python code/01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
   Waiting 1s.....
12
13
   This is the R_6_1 _standard_test.xlsx optimization process.
14
15
   Start
     Read basic data
16
17
       V = 6
18
       T = 36
       Q = 23
19
       L = 30
20
21
     PSO parameter setting:
       maxIter num = 10
23
       W inertia = 0.5
24
       oder_type_num = 15
25
       c1 = 2.5
26
       c2 = 1.0
       r1 = 0.2997559231672061
27
28
       r2 = 0.2997559231672061
29
   Begin iteration:
30
31
   iter = 0
32
       cord_individul_obj[indivial_i, :] = [ 0. 4. 50. 54.]
       cord individul obj[indivial i, :] = \begin{bmatrix} 1. & 4.56.60. \end{bmatrix}
33
       cord_individul_obj[indivial_i, :] = [ 2. 4. 54. 58.]
34
       cord_individul_obj[indivial_i, :] = [ 3. 4. 88. 92.]
35
36
       cord_individul_obj[indivial_i, :] = [4. 5. 12. 17.]
37
       cord_individul_obj[indivial_i, :] = [5. 4. 74. 78.]
       cord_individul_obj[indivial_i, :] = [6. 4. 90. 94.]
38
39
       cord_individul_obj[indivial_i, :] = [7. 4. 26. 30.]
40
       cord_individul_obj[indivial_i, :] = [8. 6. 64. 70.]
       cord_individul_obj[indivial_i, :] = [ 9. 4. 44. 48.]
41
       cord_individul_obj[indivial_i, :] = [10. 4. 28. 32.]
42
43
       cord_individul_obj[indivial_i, :] = [11. 4. 52. 56.]
       cord_individul_obj[indivial_i, :] = [12. 4. 58. 62.]
44
       cord individul_obj[indivial_i, :] = [13. 5. 72. 77.]
45
       cord individul obj[indivial i, :] = [14. 4. 70. 74.]
46
47
48
     min(cord\ individul\ obj[:, 3]) = 17.0
     historl\_G\_best\_iter[iter, 3] = 17.0
49
50
   Begin iteration:
51
52
   iter = 1
53
       cord_individul_obj[indivial_i, :] = [0. 5. 22. 27.]
54
       cord_individul_obj[indivial_i, :] = [1. 5. 8. 13.]
       cord_individul_obj[indivial_i, :] = [2. 5. 8. 13.]
55
       cord_individul_obj[indivial_i, :] = [ 3. 5. 8. 13.]
56
57
       cord_individul_obj[indivial_i, :] = [4, 6, 32, 38]
       cord individul obj[indivial i, :] = [5.5.40.45.]
58
       cord_individul_obj[indivial_i, :] = [ 6. 5. 12. 17.]
59
60
       cord_individul_obj[indivial_i, :] = [7. 5. 8. 13.]
61
       cord_individul_obj[indivial_i, :] = [ 8. 6. 8. 14.]
62
       cord_individul_obj[indivial_i, :] = [ 9. 6. 16. 22.]
       cord_individul_obj[indivial_i, :] = [10. 5. 38. 43.]
63
       cord_individul_obj[indivial_i, :] = [11. 5. 18. 23.]
64
       cord_individul_obj[indivial_i, :] = [12. 6. 8. 14.] cord_individul_obj[indivial_i, :] = [13. 4. 18. 22.]
65
66
67
       cord_individul_obj[indivial_i, :] = [14. 6. 8. 14.]
68
69
     min(cord\ individul\ obj[:, 3]) = 13.0
70
     historl\_G\_best\_iter[iter, 3] = 13.0
71
   Begin iteration:
73
   iter = 2
74
       cord_individul_obj[indivial_i, :] = [0.5.32.37.]
75
       cord_individul_obj[indivial_i, :] = [1. 4. 28. 32.]
76
       cord_individul_obj[indivial_i, :] = [2. 4. 28. 32.]
       cord_individul_obj[indivial_i, :] = [3. 6. 12. 18.]
77
       cord_individul_obj[indivial_i, :] = [4. 5. 12. 17.]
78
       cord_individul_obj[indivial_i, :] = [5. 5. 8. 13.]
```

```
cord_individul_obj[indivial_i, :] = [6. 5. 18. 23.]
 81
          cord individul obj[indivial i, :] = [7.5.12.17.]
          cord_individul_obj[indivial_i, :] = [ 8. 6. 12. 18.]
 82
 83
          cord_individul_obj[indivial_i, :] = [9. 5. 20. 25.]
 84
          cord_individul_iobj[indivial_i, :] = [10, 5, 12, 17,]
 85
          cord_individul_obj[indivial_i, :] = [11. 6. 48. 54.]
          cord_individul_obj[indivial_i, :] = [12. 5. 52. 57.]
 86
 87
          cord_individul_obj[indivial_i, :] = [13. 5. 12. 17.]
 88
          cord individul obj[indivial i, :] = [14. 6.24.30.]
 89
 90
       min(cord\_individul\_obj[:, 3]) = 13.0
 91
       historl_G_best_iter[iter, 3] = 13.0
 92
    Begin iteration:
 93
 94 iter = 3
 95
          cord_individul_obj[indivial_i, :] = [0.5.22.27.]
 96
          cord_individul_obj[indivial_i, :] = [ 1. 5. 8. 13.]
 97
          cord_individul_obj[indivial_i, :] = [ 2. 5. 16. 21.]
 98
          cord_individul_obj[indivial_i, :] = [3. 5. 54. 59.]
 99
          cord_individul_obj[indivial_i, :] = [4. 4. 8. 12.]
100
          cord_individul_obj[indivial_i, :] = [5. 6. 38. 44.]
          cord\_individul\_obj[indivial\_i, :] = [6. 4. 32. 36.]
101
102
          cord_individul_obj[indivial_i, :] = [7. 5. 22. 27.]
103
          cord individul obj[indivial i, :] = [8.6.12.18.]
          cord_individul_obj[indivial_i, :] = [9. 5. 40. 45.]
104
105
          cord_individul_obj[indivial_i, :] = [10. 4. 44. 48.]
          cord individul obj[indivial i, :] = [11. 5. 62. 67.]
106
107
          cord_individul_obj[indivial_i, :] = [12. 5. 8. 13.]
          cord_individul_obj[indivial_i, :] = [13. 5. 12. 17.]
108
109
          cord_individul_obj[indivial_i, :] = [14. 5. 18. 23.]
110
        min(cord\_individul\_obj[:, 3]) = 12.0
111
112
       historl\_G\_best\_iter[iter, 3] = 12.0
113 Begin iteration:
114
115 \text{ iter} = 4
116
          cord_individul_obj[indivial_i, :] = [0.5.28.33.]
          cord individul obj[indivial i, :] = [1.5.38.43.]
117
          cord_individul_obj[indivial_i, :] = [ 2. 5. 20. 25.]
118
119
          cord_individul_obj[indivial_i, :] = [3, 5, 20, 25]
120
          cord_individul_obj[indivial_i, :] = [4. 5. 20. 25.]
          cord_individul_obj[indivial_i, :] = [ 5. 6. 40. 46.]
121
          cord_individul_obj[indivial_i, :] = [6. 5. 18. 23.]
122
123
          cord_individul_obj[indivial_i, :] = [7. 5. 28. 33.]
124
          cord_individul_obj[indivial_i, :] = [8. 6. 12. 18.]
          cord_individul_obj[indivial_i, :] = [ 9. 6. 16. 22.]
125
126
          cord_individul_obj[indivial_i, :] = [10, 5, 36, 41]
127
          cord_individul_obj[indivial_i, :] = [11. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [12. 6. 54. 60.]
128
129
          cord_individul_obj[indivial_i, :] = [13. 5. 12. 17.]
130
          cord_individul_obj[indivial_i, :] = [14, 4, 30, 34]
131
132
       min(cord\ individul\ obj[:, 3]) = 12.0
       historl\_G\_best\_iter[iter, 3] = 12.0
133
134 Begin iteration:
135
136 iter = 5
137
          cord_individul_obj[indivial_i, :] = [0. 5. 16. 21.]
138
          cord_individul_obj[indivial_i, :] = [1. 5. 12. 17.]
          cord_individul_obj[indivial_i, :] = [2. 5. 52. 57.]
139
140
          cord_individul_obj[indivial_i, :] = [ 3. 5. 8. 13.]
141
          cord_individul_obj[indivial_i, :] = [4. 5. 28. 33.]
          cord individul obj[indivial i, :] = [5.5, 20, 25.]
142
143
          cord_individul_obj[indivial_i, :] = [ 6. 5. 12. 17.]
144
          cord_individul_obj[indivial_i, :] = [7. 5. 20. 25.]
145
          cord_individul_obj[indivial_i, :] = [ 8. 5. 12. 17.]
146
          cord_individul_obj[indivial_i, :] = [9. 6. 28. 34.]
          cord_individul_obj[indivial_i, :] = [10. 5. 12. 17.]
147
          cord_individul_obj[indivial_i, :] = [11. 5. 24. 29.]
148
149
          cord_individul_obj[indivial_i, :] = [12. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [13. 5. 12. 17.]
150
151
          cord_individul_obj[indivial_i, :] = [14. 5. 12. 17.]
152
153
       min(cord\ individul\ obj[:, 3]) = 12.0
154
       historl_G_best_iter[iter, 3] = 12.0
155 Begin iteration:
156
157 iter = 6
158
          cord_individul_obj[indivial_i, :] = [0. 5. 20. 25.]
159
          cord_individul_obj[indivial_i, :] = [ 1. 5. 12. 17.]
          cord individul obj[indivial i, :] = [2. 4. 8. 12.]
160
          cord_individul_obj[indivial_i, :] = [3. 5. 12. 17.]
161
162
          cord_individul_obj[indivial_i, :] = [4. 5. 26. 31.]
          cord_individul_obj[indivial_i, :] = [5. 5. 12. 17.]
163
```

```
164
           cord_individul_obj[indivial_i, :] = [6. 5. 12. 17.]
165
          cord individul obj[indivial i, :] = [7.5.16.21.]
          cord_individul_obj[indivial_i, :] = [ 8. 5. 20. 25.]
166
167
          cord_individul_obj[indivial_i, :] = [9. 6. 26. 32.]
168
          cord_individul_obj[indivial_i, :] = [10. 5. 92. 97.]
169
          cord_individul_obj[indivial_i, :] = [11. 5. 12. 17.]
170
          cord_individul_obj[indivial_i, :] = [12. 4. 24. 28.]
171
          cord_individul_obj[indivial_i, :] = [13. 5. 32. 37.]
172
          cord individul obj[indivial i, :] = [14. 5. 36. 41.]
173
174
        min(cord\_individul\_obj[:, 3]) = 12.0
175
        historl_G_best_iter[iter, 3] = 12.0
176 Begin iteration:
177
178 \text{ iter} = 7
179
          cord_individul_obj[indivial_i, :] = [0.5.20.25.]
180
          cord_individul_obj[indivial_i, :] = [1. 5. 12. 17.]
          cord_individul_obj[indivial_i, :] = [ 2. 5. 24. 29.]
181
182
          cord_individul_obj[indivial_i, :] = [3. 5. 12. 17.]
183
          cord_individul_obj[indivial_i, :] = [4. 5. 20. 25.]
184
          cord_individul_obj[indivial_i, :] = [5. 5. 20. 25.]
          cord\_individul\_obj[indivial\_i, :] = [6.5.16.21.]
185
186
          cord_individul_obj[indivial_i, :] = [7. 5. 28. 33.]
187
          cord individul obj[indivial i, :] = [8.5, 12, 17.]
          cord_individul_obj[indivial_i, :] = [9. 6. 74. 80.]
188
189
          cord_individul_obj[indivial_i, :] = [10. 4. 8. 12.]
          cord individul obj[indivial i, :] = [11. 5. 12. 17.]
190
191
          cord_individul_obj[indivial_i, :] = [12. 4. 12. 16.]
192
          cord_individul_obj[indivial_i, :] = [13. 5. 20. 25.]
193
          cord_individul_obj[indivial_i, :] = [14. 5. 20. 25.]
194
195
        min(cord_individul_obj[:, 3]) = 12.0
196
        historl\_G\_best\_iter[iter, 3] = 12.0
197
     Begin iteration:
198
199 iter = 8
200
          cord_individul_obj[indivial_i, :] = [0.5.16.21.]
          cord individul obj[indivial i, :] = [1.5.12.17.]
201
202
          cord_individul_obj[indivial_i, :] = [ 2. 5. 20. 25.]
203
          cord_individul_obj[indivial_i, :] = [3. 6. 12. 18.]
204
          cord_individul_obj[indivial_i, :] = [4. 6. 56. 62.]
205
          cord_individul_obj[indivial_i, :] = [ 5. 6. 28. 34.]
          cord_individul_obj[indivial_i, :] = [6. 5. 28. 33.]
206
207
          cord_individul_obj[indivial_i, :] = [7. 5. 22. 27.]
208
          cord_individul_obj[indivial_i, :] = [8. 5. 12. 17.]
          cord_individul_obj[indivial_i, :] = [ 9. 4. 8. 12.]
209
210
          cord_individul_obj[indivial_i, :] = [10. 5. 98. 103.]
211
          cord_individul_obj[indivial_i, :] = [11. 6. 8. 14.]
          cord_individul_obj[indivial_i, :] = [12. 6. 16. 22.]
212
          cord_individul_obj[indivial_i, :] = [13. 5. 28. 33.]
213
214
          cord_individul_obj[indivial_i, :] = [14. 6. 60. 66.]
215
216
        min(cord\ individul\ obj[:, 3]) = 12.0
        historl\_G\_best\_iter[iter, 3] = 12.0
217
218 Begin iteration:
219
220 \text{ iter} = 9
221
          cord_individul_obj[indivial_i, :] = [0. 5. 20. 25.]
222
          cord_individul_obj[indivial_i, :] = [1. 5. 20. 25.]
          cord_individul_obj[indivial_i, :] = [2. 5. 16. 21.]
223
224
          cord_individul_obj[indivial_i, :] = [3. 6. 12. 18.]
225
          cord_individul_obj[indivial_i, :] = [4. 6. 20. 26.]
226
          cord individul obj[indivial i, :] = [5. 6. 16. 22.]
227
          cord\_individul\_obj[indivial\_i, :] = [6. 5. 20. 25.]
228
          cord_individul_obj[indivial_i, :] = [7. 5. 16. 21.]
229
          cord_individul_obj[indivial_i, :] = [8. 5. 36. 41.]
230
          cord_individul_obj[indivial_i, :] = [9. 4. 44. 48.]
          cord_individul_obj[indivial_i, :] = [10. 4. 8. 12.]
231
          cord_individul_obj[indivial_i, :] = [11. 6. 52. 58.]
232
233
          cord_individul_obj[indivial_i, :] = [12. 6. 12. 18.]
          cord_individul_obj[indivial_i, :] = [13. 5. 16. 21.]
234
235
          cord_individul_obj[indivial_i, :] = [14, 6, 20, 26]
236
237
        min(cord\ individul\ obj[:, 3]) = 12.0
238
        historl_G_best_iter[iter, 3] = 12.0
239 Begin iteration:
240
241 \text{ iter} = 10
          cord_individul_obj[indivial_i, :] = [0. 5. 20. 25.]
242
243
          cord_individul_obj[indivial_i, :] = [ 1. 5. 12. 17.]
244
          cord individul obj[indivial i, :] = [2.5.60.65.]
          cord_individul_obj[indivial_i, :] = [3. 6. 8. 14.]
245
246
          cord_individul_obj[indivial_i, :] = [4. 6. 26. 32.]
          cord_individul_obj[indivial_i, :] = [5. 6. 32. 38.]
247
```

```
unknown
248
           cord_individul_obj[indivial_i, :] = [6. 5. 20. 25.]
249
           cord individul obj[indivial i, :] = [7.5.28.33.]
           cord_individul_obj[indivial_i, :] = [ 8. 5. 20. 25.]
250
251
           cord_individul_obj[indivial_i, :] = [9. 6. 24. 30.]
252
           cord_individul_obj[indivial_i, :] = [10. 5. 70. 75.]
253
           cord_individul_obj[indivial_i, :] = [11. 4. 8. 12.]
           cord_individul_obj[indivial_i, :] = [12. 6. 24. 30.]
254
255
           cord_individul_obj[indivial_i, :] = [13. 5. 48. 53.]
256
           cord individul obj[indivial i, :] = [14. 6.74.80.]
257
258
        min(cord\_individul\_obj[:, 3]) = 12.0
259
        historl_G_best_iter[iter, 3] = 12.0
260 Iteration calculate over
261
262
263
264
265
     All item are in Bin and:
266
        Bin area = 1080
267
        Real area = 106.0
268
        Proportion of area = 0.09814814814814815
269
           BEST_CHROM =
270
             berth: [11.5 26. 3. 20.5 7.5 16.]
271
             time: [0. 0. 0. 0. 0. 0.]
272
             num_QC: [2. 2. 4. 2. 2. 3.]
273
        Objective function values and some other indicators:
274
           Obj0 = 4.00
                                Obj1 = 8.00
                                                       Obj0 + Obj1 = 12.00
275
           Total movement of crane: 8.00
276
           Total waiting time in berth position: 0.00
277
           Total index of q during berthing: 488.00
278
        Specific arrangement for each vessel:
                                                                                                                               gama_i0: 0.0
279
                                                  xi: 11.5
                                                                                                   tail of i: 14.0
           V_id: 0
                                                                        bow of i: 9.0
                                                                                                                                                          gama_i1: 1
                              li: 5.0
      0.
                       gama_i1 + 1: 2.0
                                                     gama_i1 - gama_i0: 1.0
                                                                                          duration_time_i: 2.0
                                                                                                                            demand_i: 80.0
                                                                                                                                                          work
      load_i: 80.0
                              work load gap_i: 0
                                                  xi: 26.0
280
           V_id: 1
                              li: 6.0
                                                                        bow of i: 23.0
                                                                                                   tail of i: 29.0
                                                                                                                               gama i0: 0.0
                                                                                                                                                          gama_i1: 2
                       gama_i1 + 1: 3.0
                                                                                          duration_time_i: 3.0
                                                     gama_i1 - gama_i0: 2.0
                                                                                                                            demand_i: 120.0
                                                                                                                                                          work
      load_i: 120.0
                                 work load gap_i: 0
281
           V_id: 2
                              li: 6.0
                                                  xi: 3.0
                                                                      bow of i: 0.0
                                                                                                 tail of i: 6.0
                                                                                                                          gama i0: 0.0
                                                                                                                                                     gama i1: 3.0
                     gama_i1 + 1: 4.0
                                                  gama_i1 - gama_i0: 3.0
                                                                                       duration\_time\_i{:}~4.0
                                                                                                                          demand_i: 260.0
                                                                                                                                                        work load_i:
      260.0
                          work load gap_i: 0
282
           V_id: 3
                              li: 5.0
                                                  xi: 20.5
                                                                        bow of i: 18.0
                                                                                                   tail of i: 23.0
                                                                                                                               gama_i0: 0.0
                                                                                                                                                          gama_i1: 1
      0.
                       gama_i1 + 1: 2.0
                                                     gama i1 - gama i0: 1.0
                                                                                          duration_time_i: 2.0
                                                                                                                            demand i: 80.0
                                                                                                                                                          work
      load_i: 80.0
                              work load gap_i: 0
283
           V_id: 4
                              li: 3.0
                                                  xi: 7.5
                                                                      bow of i: 6.0
                                                                                                 tail of i: 9.0
                                                                                                                          gama_i0: 0.0
                                                                                                                                                     gama i1: 4.0
                                                  gama_i1 - gama_i0: 4.0
                                                                                                                          demand_i: 200.0
                                                                                                                                                        work load_i:
                     gama_i1 + 1: 5.0
                                                                                       duration_time_i: 5.0
                          work load gap_i: 0
284
                                                  xi: 16.0
                                                                                                                                                          gama_i1: 3
           V_id: 5
                              li: 4.0
                                                                        bow of i: 14.0
                                                                                                   tail of i: 18.0
                                                                                                                               gama_i0: 0.0
                       gama_i1 + 1: 4.0
                                                     gama_i1 - gama_i0: 3.0
                                                                                          duration_time_i: 4.0
                                                                                                                             demand_i: 220.0
                                                                                                                                                          work
      load_i: 220.0
                                 work load gap i: 0
285
286 Algorithm finished and the total CPU time: 123 s
287 End
288
```