```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=12015
 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:
       Trail = 24
23
       maxIter num = 10
24
       W inertia = 2.0
25
       oder_type_num = 15
26
       c1 = 1.0
       c2 = 1.5
27
28
       r1 = 0.15937316503863208
29
       r2 = 0.15937316503863208
30 Begin iteration:
31
32
   iter = 0
33
       cord individul obj[indivial i, :] = [0.4.82.86.]
       cord_individul_obj[indivial_i, :] = [1. 6. 32. 38.]
34
       cord\_individul\_obj[indivial\_i,:] = [\ 2.\ 5.\ 120.\ 125.]
35
36
       cord_individul_obj[indivial_i, :] = [ 3. 4. 58. 62.]
37
       cord_individul_obj[indivial_i, :] = [4. 3. 38. 41.]
       cord_individul_obj[indivial_i, :] = [5. 5. 88. 93.]
38
39
       cord_individul_obj[indivial_i, :] = [6. 4. 14. 18.]
40
       cord_individul_obj[indivial_i, :] = [7. 4. 48. 52.]
       cord_individul_obj[indivial_i, :] = [ 8. 6. 12. 18.]
41
       cord_individul_obj[indivial_i, :] = [ 9. 4. 68. 72.]
42
43
       cord_individul_obj[indivial_i, :] = [10. 5. 76. 81.]
       cord individul_obj[indivial_i, :] = [11. 4. 82. 86.]
44
45
       cord_individul_obj[indivial_i, :] = [ 12. 5. 100. 105.]
       cord\_individul\_obj[indivial\_i, :] = [13. 5. 38. 43.]
46
47
       cord_individul_obj[indivial_i, :] = [14. 3. 12. 15.]
48
49
     min(cord\_individul\_obj[:, 3]) = 15.0
50
     historl\_G\_best\_iter[iter, 3] = 15.0
51
   Begin iteration:
52
53
   iter = 1
54
       cord_individul_obj[indivial_i, :] = [0. 3. 136. 139.]
       cord_individul_obj[indivial_i, :] = [1. 5. 38. 43.]
55
       cord_individul_obj[indivial_i, :] = [ 2. 3. 12. 15.]
56
57
       cord_individul_obj[indivial_i, :] = [3. 4. 84. 88.]
       cord individul obj[indivial i, :] = \begin{bmatrix} 4 & 3.94.97. \end{bmatrix}
58
       cord_individul_obj[indivial_i, :] = [ 5. 5. 58. 63.]
59
60
       cord_individul_obj[indivial_i, :] = [ 6. 3. 124. 127.]
61
       cord_individul_obj[indivial_i, :] = [ 7. 4. 18. 22.]
62
       cord_individul_obj[indivial_i, :] = [8. 6. 32. 38.]
       cord_individul_obj[indivial_i, :] = [ 9. 6. 42. 48.]
63
       cord_individul_obj[indivial_i, :] = [10. 4. 74. 78.]
64
65
       cord_individul_obj[indivial_i, :] = [11. 5. 34. 39.]
       cord_individul_obj[indivial_i, :] = [12. 5. 30. 35.]
66
67
       cord_individul_obj[indivial_i, :] = [13. 6. 8. 14.]
68
       cord_individul_obj[indivial_i, :] = [14. 3. 24. 27.]
69
70
     min(cord\_individul\_obj[:, 3]) = 14.0
71
     historl G best iter[iter, 3] = 14.0
   Begin iteration:
73
74
   iter = 2
75
       cord_individul_obj[indivial_i, :] = [ 0. 6. 8. 14.]
76
       cord individul obj[indivial i, :] = [1. 4. 18. 22.]
       cord_individul_obj[indivial_i, :] = [ 2. 4. 96. 100.]
77
       cord_individul_obj[indivial_i, :] = [3. 6. 44. 50.]
78
       cord_individul_obj[indivial_i, :] = [ 4. 4. 44. 48.
79
```

```
cord_individul_obj[indivial_i, :] = [5. 4. 18. 22.]
 81
          cord individul obj[indivial i, :] = [6.5.18.23.]
          cord_individul_obj[indivial_i, :] = [7. 4. 58. 62.]
 82
 83
          cord_individul_obj[indivial_i, :] = [ 8. 6. 8. 14.]
 84
          cord_individul_obj[indivial_i, :] = [ 9. 3. 80. 83.]
 85
          cord_individul_obj[indivial_i, :] = [10. 6. 36. 42.]
          cord_individul_obj[indivial_i, :] = [11. 6. 12. 18.]
 86
          cord_individul_obj[indivial_i, :] = [12. 3. 26. 29.]
 87
 88
          cord_individul_obj[indivial_i, :] = [13. 6. 16. 22.]
          cord_individul_obj[indivial_i, :] = [14. 4. 52. 56.]
 89
 90
 91
        min(cord\_individul\_obj[:, 3]) = 14.0
       historl G best iter[iter, 3] = 14.0
 92
 93 Begin iteration:
 94
 95
          cord individul_obj[indivial_i, :] = [ 0. 6. 18. 24.]
 96
          cord_individul_obj[indivial_i, :] = [ 1. 3. 40. 43.]
 97
 98
          cord_individul_obj[indivial_i, :] = [2. 6. 8. 14.]
 99
          cord individul obj[indivial i, :] = [3. 6.44.50.]
100
          cord_individul_obj[indivial_i, :] = [4. 4. 56. 60.]
          cord\_individul\_obj[indivial\_i, :] = [5. 4. 50. 54.]
101
102
          cord_individul_obj[indivial_i, :] = [6. 4. 44. 48.]
          cord_individul_obj[indivial_i, :] = [ 7. 4. 30. 34.]
103
          cord_individul_obj[indivial_i, :] = [ 8. 6. 8. 14.]
104
105
          cord_individul_obj[indivial_i, :] = [9. 6. 8. 14.]
          cord individul obj[indivial i, :] = [10. 6. 28. 34.]
106
107
          cord_individul_obj[indivial_i, :] = [11. 6. 28. 34.]
          cord_individul_obj[indivial_i, :] = [12. 6. 12. 18.]
108
109
          cord_individul_obj[indivial_i, :] = [13. 4. 56. 60.]
110
          cord individul obj[indivial i, :] = [14. 5. 8. 13.]
111
112
        min(cord\_individul\_obj[:, 3]) = 13.0
        historl\_G\_best\_iter[iter, 3] = 13.0
113
114 Begin iteration:
115
116 \text{ iter} = 4
117
          cord individul obj[indivial i, :] = [0.6.8.14.]
          cord_individul_obj[indivial_i, :] = [ 1. 4. 84. 88.]
118
119
          cord_individul_obj[indivial_i, :] = [2. 3. 86. 89.]
120
          cord_individul_obj[indivial_i, :] = [3. 6. 16. 22.]
          cord individul_obj[indivial_i, :] = [ 4. 5. 8. 13.]
121
          cord_individul_obj[indivial_i, :] = [5. 3. 54. 57.]
122
123
          cord_individul_obj[indivial_i, :] = [6. 5. 68. 73.]
124
          cord_individul_obj[indivial_i, :] = [7. 6. 44. 50.]
          cord_individul_obj[indivial_i, :] = [ 8. 6. 18. 24.]
125
          cord_individul_obj[indivial_i, :] = [9. 5. 80. 85.]
126
127
          cord_individul_obj[indivial_i, :] = [10. 4. 42. 46.]
          cord individul obi[indivial i, :] = [11, 4, 24, 28,]
128
129
          cord_individul_obj[indivial_i, :] = [12. 6. 12. 18.]
130
          cord individul obj[indivial i, :] = [13. 4. 72. 76.]
131
          cord_individul_obj[indivial_i, :] = [14. 4. 52. 56.]
132
        min(cord\_individul\_obj[:, 3]) = 13.0
133
134
        historl\_G\_best\_iter[iter, 3] = 13.0
135 Begin iteration:
136
137 iter = 5
138
          cord_individul_obj[indivial_i, :] = [ 0. 6. 8. 14.]
          cord_individul_obj[indivial_i, :] = [1. 4. 66. 70.]
139
          cord_individul_obj[indivial_i, :] = [ 2. 5. 8. 13.]
140
141
          cord_individul_obj[indivial_i, :] = [3. 6. 16. 22.]
          cord individul obj[indivial i, :] = \begin{bmatrix} 4.5.48.53. \end{bmatrix}
142
143
          cord_individul_obj[indivial_i, :] = [5. 4. 50. 54.]
          cord_individul_obj[indivial_i, :] = [6. 3. 68. 71.]
144
145
          cord_individul_obj[indivial_i, :] = [ 7. 6. 12. 18.]
146
          cord_individul_obj[indivial_i, :] = [ 8. 6. 8. 14.]
          cord_individul_obj[indivial_i, :] = [9. 6. 8. 14.]
147
          cord_individul_obj[indivial_i, :] = [10. 4. 42. 46.]
148
149
          cord_individul_obj[indivial_i, :] = [11. 4. 78. 82.]
          cord_individul_obj[indivial_i, :] = [12. 6. 12. 18.]
150
151
          cord_individul_obj[indivial_i, :] = [13. 3. 54. 57.]
152
          cord_individul_obj[indivial_i, :] = [14. 4. 8. 12.]
153
154
        min(cord\_individul\_obj[:, 3]) = 12.0
155
        historl\_G\_best\_iter[iter, 3] = 12.0
156 Begin iteration:
157
158 iter = 6
159
          cord_individul_obj[indivial_i, :] = [0. 6. 54. 60.]
160
          cord individul obj[indivial i, :] = [1. 4.32.36.]
          cord_individul_obj[indivial_i, :] = [2. 3. 56. 59.]
161
162
          cord_individul_obj[indivial_i, :] = [3. 6. 36. 42.]
          cord_individul_obj[indivial_i, :] = [4. 5. 32. 37.]
163
```

```
164
           cord_individul_obj[indivial_i, :] = [ 5. 3.112.115.]
165
           cord individul obj[indivial i, :] = [6.5.30.35.]
           cord_individul_obj[indivial_i, :] = [7. 4. 28. 32.]
166
167
           cord_individul_obj[indivial_i, :] = [ 8. 6. 54. 60.]
           cord_individul_iobj[indivial_i, :] = [9. 5. 54. 59.]
168
169
           cord_individul_obj[indivial_i, :] = [10. 4. 74. 78.]
170
           cord_individul_obj[indivial_i, :] = [11. 4. 8. 12.]
           cord_individul_obj[indivial_i, :] = [12. 6. 88. 94.]
171
172
           cord_individul_obj[indivial_i, :] = [13. 6. 34. 40.]
           cord_individul_obj[indivial_i, :] = [14. 5. 72. 77.]
173
174
175
        min(cord\_individul\_obj[:, 3]) = 12.0
        historl G best iter[iter, 3] = 12.0
176
177 Begin iteration:
178
179
180
           cord_individul_obj[indivial_i, :] = [0. 6.112.118.]
           cord_individul_obj[indivial_i, :] = [1. 4. 70. 74.]
181
           cord_individul_obj[indivial_i, :] = [ 2. 4. 104. 108.]
182
183
           cord_individul_obj[indivial_i, :] = [ 3. 6. 44. 50.]
184
           cord_individul_obj[indivial_i, :] = [4. 4. 94. 98.]
           cord_individul_obj[indivial_i, :] = [5. 4. 8. 12.]
185
186
           cord_individul_obj[indivial_i, :] = [6. 5. 72. 77.]
           cord individul obj[indivial i, :] = [7. 6.44.50.]
187
           cord_individul_obj[indivial_i, :] = [ 8. 6. 8. 14.]
188
189
           cord_individul_obj[indivial_i, :] = [9. 6. 8. 14.]
           cord individul obj[indivial i, :] = [10. 4. 84. 88.]
190
191
           cord_individul_obj[indivial_i, :] = [11. 5. 78. 83.]
192
           cord_individul_obj[indivial_i, :] = [12. 6. 24. 30.]
193
           cord_individul_obj[indivial_i, :] = [13. 3. 104. 107.]
194
           cord individul obj[indivial i, :] = [14. 4. 82. 86.]
195
196
        min(cord\_individul\_obj[:, 3]) = 12.0
197
        historl\_G\_best\_iter[iter, 3] = 12.0
198 Begin iteration:
199
200 \text{ iter} = 8
201
           cord individul obj[indivial i, :] = [0.4.8.12.]
202
           cord_individul_obj[indivial_i, :] = [ 1. 4. 38. 42.]
203
           cord_individul_obj[indivial_i, :] = [2. 3. 58. 61.]
204
           cord_individul_obj[indivial_i, :] = [3. 6. 88. 94.]
           cord_individul_obj[indivial_i, :] = [ 4. 4. 96. 100.] cord_individul_obj[indivial_i, :] = [ 5. 3. 108. 111.]
205
206
207
           cord_individul_obj[indivial_i, :] = [6. 3. 68. 71.]
208
           cord_individul_obj[indivial_i, :] = [7. 6. 8. 14.]
           cord_individul_obj[indivial_i, :] = [ 8. 4. 12. 16.]
209
210
           cord_individul_obj[indivial_i, :] = [9. 3. 54. 57.]
211
           cord_individul_obj[indivial_i, :] = [10. 5. 26. 31.]
           cord individul obi[indivial i, :] = [11. 4.48.52.]
212
213
           cord_individul_obj[indivial_i, :] = [12. 6. 12. 18.]
214
           cord_individul_obj[indivial_i, :] = [13. 3. 72. 75.]
           cord_individul_obj[indivial_i, :] = [14. 5. 62. 67.]
215
216
217
        min(cord\_individul\_obj[:, 3]) = 12.0
218
        historl\_G\_best\_iter[iter, 3] = 12.0
219 Begin iteration:
220
221 \text{ iter} = 9
222
           cord_individul_obj[indivial_i, :] = [0. 4. 60. 64.]
           cord_individul_obj[indivial_i, :] = [1. 4. 68. 72.]
223
224
           cord\_individul\_obj[indivial\_i, :] = [2. 3.108.111.]
225
           cord_individul_obj[indivial_i, :] = [3. 6. 80. 86.]
226
           cord individul obj[indivial i, :] = \begin{bmatrix} 4. & 4. & 96. & 100. \end{bmatrix}
227
           cord_individul_obj[indivial_i, :] = [5. 4. 8. 12.]
228
           cord_individul_obj[indivial_i, :] = [6. 5. 38. 43.]
229
           cord_individul_obj[indivial_i, :] = [7. 6. 8. 14.]
230
           cord_individul_obj[indivial_i, :] = [ 8. 4. 8. 12.]
           cord_individul_obj[indivial_i, :] = [9. 6. 8. 14.]
231
           cord_individul_obj[indivial_i, :] = [ 10. 4. 100. 104.]
232
233
           cord_individul_obj[indivial_i, :] = [11. 4. 86. 90.]
234
           cord_individul_obj[indivial_i, :] = [12. 6. 8. 14.]
235
           cord_individul_obj[indivial_i, :] = [13. 4. 72. 76.]
236
           cord_individul_obj[indivial_i, :] = [ 14. 4.112.116.]
237
238
        min(cord\_individul\_obj[:, 3]) = 12.0
239
        historl\_G\_best\_iter[iter, 3] = 12.0
240 Begin iteration:
241
242 \text{ iter} = 10
243
           cord_individul_obj[indivial_i, :] = [0. 4. 52. 56.]
244
           cord individul obj[indivial i, :] = \begin{bmatrix} 1. & 4.100.104. \end{bmatrix}
           cord\_individul\_obj[indivial\_i, :] = [2. 3. 28. 31.]
245
246
           cord_individul_obj[indivial_i, :] = [3. 5. 90. 95.]
           cord_individul_obj[indivial_i, :] = [ 4. 4. 108. 112.]
247
```

```
248
          cord_individul_obj[indivial_i, :] = [ 5. 3. 108. 111.]
249
          cord individul obj[indivial i, :] = [6.5.20.25.]
          cord_individul_obj[indivial_i, :] = [7. 6. 72. 78.]
250
251
          cord_individul_obj[indivial_i, :] = [8. 4. 30. 34.]
252
          cord_individul_iobj[indivial_i, :] = [9. 4. 20. 24.]
253
          cord individul obj[indivial i, :] = [10. 4. 44. 48.]
          cord_individul_obj[indivial_i, :] = [11. 5. 78. 83.]
254
          cord_individul_obj[indivial_i, :] = [12. 6. 28. 34.]
255
256
          cord_individul_obj[indivial_i, :] = [ 13. 5. 112. 117.]
          cord_individul_obj[indivial_i, :] = [14. 4. 8. 12.]
257
258
259
        min(cord\_individul\_obj[:, 3]) = 12.0
       historl G best iter[iter, 3] = 12.0
260
261 Iteration calculate over
262
263
264
265
266
     All item are in Bin and:
267
        Bin area = 1080
        Real area = 90.0
268
        269
270
          BEST_CHROM =
271
            berth: [20.5 26. 6. 11.5 1.5 16.]
            time: [0. 0. 0. 0. 0. 0.]
272
273
            num_QC: [3. 2. 3. 4. 2. 4.]
274
        Objective function values and some other indicators:
275
          Obio = 4.00
                                Obj1 = 8.00
                                                      Obj0 + Obj1 = 12.00
276
          Total movement of crane: 8.00
277
          Total waiting time in berth position: 0.00
278
          Total index of q during berthing: 471.00
279
        Specific arrangement for each vessel:
280
          V_id: 0
                             li: 5.0
                                                 xi: 20.5
                                                                       bow of i: 18.0
                                                                                                 tail of i: 23.0
                                                                                                                            gama_i0: 0.0
                                                                                                                                                       gama_i1: 1
                      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
281
                                                 xi: 26.0
                                                                       bow of i: 23.0
                                                                                                 tail of i: 29.0
                                                                                                                            gama_i0: 0.0
                                                                                                                                                       gama_i1: 2
          V_id: 1
                             li: 6.0
                      gama i1 + 1: 3.0
                                                   gama_i1 - gama_i0: 2.0
                                                                                        duration_time_i: 3.0
                                                                                                                          demand_i: 120.0
                                                                                                                                                       work
     load i: 120.0
                                work load gap_i: 0
282
                                                 xi: 6.0
                                                                     bow of i: 3.0
                                                                                               tail of i: 9.0
                                                                                                                       gama i0: 0.0
                                                                                                                                                  gama i1: 4.0
          V_id: 2
                             1i: 6.0
                    gama_i1 + 1: 5.0
                                                 gama_i1 - gama_i0: 4.0
                                                                                     duration_time_i: 5.0
                                                                                                                       demand_i: 260.0
                                                                                                                                                     work load_i:
                         work load gap_i: 0
283
          V_id: 3
                             li: 5.0
                                                 xi: 11.5
                                                                       bow of i: 9.0
                                                                                                 tail of i: 14.0
                                                                                                                            gama i0: 0.0
                                                                                                                                                       gama_i1: 0
                       gama_i1 + 1: 1.0
                                                                                        duration_time_i: 1.0
                                                                                                                          demand_i: 80.0
      0
                                                    gama_i1 - gama_i0: 0.0
                                                                                                                                                       work
     load i: 80.0
                              work load gap_i: 0
284
                                                                                                                                                  gama_i1: 4.0
          V_id: 4
                             li: 3.0
                                                 xi: 1.5
                                                                    bow of i: 0.0
                                                                                               tail of i: 3.0
                                                                                                                       gama_i0: 0.0
                    gama_i1 + 1: 5.0
                                                 gama_i1 - gama_i0: 4.0
                                                                                     duration_time_i: 5.0
                                                                                                                       demand i: 200.0
                                                                                                                                                     work load i:
     200.0
                         work load gap_i: 0
                                                                       bow of i: 14.0
285
          V_id: 5
                             li: 4.0
                                                 xi: 16.0
                                                                                                 tail of i: 18.0
                                                                                                                            gama_i0: 0.0
                                                                                                                                                       gama_i1: 2
                      gama_i1 + 1: 3.0
                                                   gama_i1 - gama_i0: 2.0
                                                                                        duration_time_i: 3.0
                                                                                                                          demand_i: 220.0
                                                                                                                                                       work
     load_i: 220.0
                                work load gap_i: 0
286
287 Algorithm finished and the total CPU time: 62 s
288 End
289
```