```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=12322
 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
       r1 = 0.24003939419270637
28
29
       r2 = 0.24003939419270637
30 Begin iteration:
31
32
   iter = 0
33
       cord individul obj[indivial i, :] = [0.5.34.39.]
       cord_individul_obj[indivial_i, :] = [ 1. 4. 128. 132.]
34
       cord\_individul\_obj[indivial\_i, :] = [2. 6. 8. 14.]
35
36
       cord_individul_obj[indivial_i, :] = [3. 6. 60. 66.]
37
       cord_individul_obj[indivial_i, :] = [4. 4. 86. 90.]
       cord_individul_obj[indivial_i, :] = [5. 5. 38. 43.]
38
39
       cord_individul_obj[indivial_i, :] = [6. 4. 24. 28.]
40
       cord_individul_obj[indivial_i, :] = [ 7. 5. 112. 117.]
       cord_individul_obj[indivial_i, :] = [8. 5. 16. 21.]
41
       cord_individul_obj[indivial_i, :] = [ 9. 3. 154. 157.]
42
43
       cord_individul_obj[indivial_i, :] = [10. 5. 88. 93.]
       cord individul obi[indivial i, :] = [11. 6.56.62.]
44
       cord_individul_obj[indivial_i, :] = [12. 5. 48. 53.]
45
46
       cord_individul_obj[indivial_i, :] = [13, 3, 8, 11.]
47
       cord_individul_obj[indivial_i, :] = [14. 6. 36. 42.]
48
49
     min(cord\_individul\_obj[:, 3]) = 11.0
50
     historl\_G\_best\_iter[iter, 3] = 11.0
51
   Begin iteration:
52
53
   iter = 1
54
       cord_individul_obj[indivial_i, :] = [ 0. 5. 76. 81.]
       cord_individul_obj[indivial_i, :] = [1. 5. 88. 93.]
55
       cord_individul_obj[indivial_i, :] = [2. 4. 38. 42.]
56
57
       cord_individul_obj[indivial_i, :] = [3. 6. 56. 62.]
       cord individul obj[indivial i, :] = \begin{bmatrix} 4. & 4. & 68. & 72. \end{bmatrix}
58
       cord_individul_obj[indivial_i, :] = [ 5. 6. 12. 18.]
59
60
       cord_individul_obj[indivial_i, :] = [6. 5. 52. 57.]
61
       cord_individul_obj[indivial_i, :] = [ 7. 4. 136. 140.]
62
       cord_individul_obj[indivial_i, :] = [ 8. 5. 72. 77.]
       cord_individul_obj[indivial_i, :] = [9. 3. 8. 11.]
63
       cord_individul_obj[indivial_i, :] = [10. 4. 18. 22.]
64
65
       cord_individul_obj[indivial_i, :] = [11. 6. 38. 44.]
       cord_individul_obj[indivial_i, :] = [12. 6. 34. 40.]
66
67
       cord_individul_obj[indivial_i, :] = [13. 6. 48. 54.]
68
       cord_individul_obj[indivial_i, :] = [14. 4. 76. 80.]
69
70
     min(cord\_individul\_obj[:, 3]) = 11.0
71
     historl G best iter[iter, 3] = 11.0
   Begin iteration:
73
74
   iter = 2
75
       cord_individul_obj[indivial_i, :] = [0. 4. 72. 76.]
76
       cord individul obj[indivial i, :] = \begin{bmatrix} 1. & 3.164.167. \end{bmatrix}
       cord_individul_obj[indivial_i, :] = [ 2. 6. 8. 14.1
77
       cord_individul_obj[indivial_i, :] = [ 3. 6. 72. 78.]
78
       cord_individul_obj[indivial_i, :] = [ 4. 5. 72. 77.
79
```

```
cord_individul_obj[indivial_i, :] = [5. 3. 24. 27.]
 81
          cord individul obj[indivial i, :] = [6. 6. 24. 30.]
          cord_individul_obj[indivial_i, :] = [7. 3. 8. 11.]
 82
 83
          cord_individul_obj[indivial_i, :] = [8. 5. 72. 77.]
 84
          cord_individul_obj[indivial_i, :] = [ 9. 3. 52. 55.]
 85
          cord_individul_obj[indivial_i, :] = [10. 6. 16. 22.]
          cord_individul_obj[indivial_i, :] = [11. 6. 28. 34.]
 86
          cord_individul_obj[indivial_i, :] = [12. 3. 26. 29.]
 87
 88
          cord_individul_obj[indivial_i, :] = [ 13. 3. 104. 107.]
          cord_individul_obj[indivial_i, :] = [14. 4. 90. 94.]
 89
 90
 91
        min(cord\_individul\_obj[:, 3]) = 11.0
       historl_G_best_iter[iter, 3] = 11.0
 92
 93 Begin iteration:
 94
 95
 96
          cord_individul_obj[indivial_i, :] = [ 0. 4. 88. 92.]
 97
          cord_individul_obj[indivial_i, :] = [1. 3. 8. 11.]
          cord_individul_obj[indivial_i, :] = [ 2. 5. 184. 189.]
 98
 99
          cord_individul_obj[indivial_i, :] = [ 3. 6. 56. 62.]
100
          cord_individul_obj[indivial_i, :] = [ 4. 5. 106. 111.]
          cord_individul_obj[indivial_i, :] = [5. 6. 8. 14.]
101
102
          cord_individul_obj[indivial_i, :] = [6. 6. 24. 30.]
          cord individul obj[indivial i, :] = [7.5, 76.81.]
103
          cord_individul_obj[indivial_i, :] = [ 8. 4. 56. 60.]
104
105
          cord_individul_obj[indivial_i, :] = [9. 3. 52. 55.]
          cord individul obj[indivial i, :] = [10. 6. 18. 24.]
106
107
          cord_individul_obj[indivial_i, :] = [11. 6. 76. 82.]
          cord_individul_obj[indivial_i, :] = [12. 6. 32. 38.]
108
109
          cord_individul_obj[indivial_i, :] = [13. 4. 68. 72.]
110
          cord individul obj[indivial i, :] = [ 14. 4. 158. 162.]
111
112
        min(cord\_individul\_obj[:, 3]) = 11.0
        historl\_G\_best\_iter[iter, 3] = 11.0
113
114 Begin iteration:
115
116 \text{ iter} = 4
117
          cord individul obj[indivial i, :] = [0.3.62.65.]
118
          cord_individul_obj[indivial_i, :] = [1. 3. 74. 77.]
          cord_individul_obj[indivial_i, :] = [2. 3. 8. 11.]
119
120
          cord_individul_obj[indivial_i, :] = [ 3. 4. 98. 102.]
121
          cord\_individul\_obj[indivial\_i, :] = [4. 3. 124. 127.]
          cord_individul_obj[indivial_i, :] = [ 5. 4. 18. 22.]
122
123
          cord_individul_obj[indivial_i, :] = [6. 5. 18. 23.]
124
          cord_individul_obj[indivial_i, :] = [7. 5. 76. 81.]
          cord_individul_obj[indivial_i, :] = [ 8. 4. 44. 48.]
125
126
          cord_individul_obj[indivial_i, :] = [9. 4. 44. 48.]
127
          cord_individul_obj[indivial_i, :] = [10. 5. 18. 23.]
          cord_individul_obj[indivial_i, :] = [11. 5. 72. 77.]
128
129
          cord_individul_obj[indivial_i, :] = [12. 6. 8. 14.]
130
          cord_individul_obj[indivial_i, :] = [13. 6. 24. 30.]
131
          cord_individul_obj[indivial_i, :] = [14. 3. 44. 47.]
132
133
        min(cord\_individul\_obj[:, 3]) = 11.0
134
        historl\_G\_best\_iter[iter, 3] = 11.0
135 Begin iteration:
136
137 iter = 5
138
          cord_individul_obj[indivial_i, :] = [ 0. 5. 110. 115.]
          cord_individul_obj[indivial_i, :] = [1. 3. 86. 89.]
139
140
          cord_individul_obj[indivial_i, :] = [ 2. 6. 12. 18.]
141
          cord_individul_obj[indivial_i, :] = [ 3. 4. 100. 104.]
          cord individul obj[indivial i, :] = \begin{bmatrix} 4 & 3 & 8 & 11 \end{bmatrix}
142
143
          cord_individul_obj[indivial_i, :] = [5. 6. 8. 14.]
          cord_individul_obj[indivial_i, :] = [6. 6. 8. 14.]
144
145
          cord_individul_obj[indivial_i, :] = [ 7. 4. 156. 160.]
146
          cord_individul_obj[indivial_i, :] = [8. 4. 68. 72.]
          cord individul_obj[indivial_i, :] = [ 9. 3. 70. 73.]
147
          cord_individul_obj[indivial_i, :] = [10. 6. 8. 14.]
148
149
          cord_individul_obj[indivial_i, :] = [11. 3. 96. 99.]
150
          cord_individul_obj[indivial_i, :] = [12. 6. 32. 38.]
151
          cord_individul_obj[indivial_i, :] = [13. 4. 68. 72.]
152
          cord_individul_obj[indivial_i, :] = [14. 4. 52. 56.]
153
154
        min(cord\_individul\_obj[:, 3]) = 11.0
155
        historl_G_best_iter[iter, 3] = 11.0
156 Begin iteration:
157
158 iter = 6
159
          cord_individul_obj[indivial_i, :] = [0.5.84.89.]
160
          cord individul obj[indivial i, :] = [1.5.52.57.]
          cord_individul_obj[indivial_i, :] = [ 2. 5. 54. 59.]
161
162
          cord_individul_obj[indivial_i, :] = [3. 4. 70. 74.]
          cord_individul_obj[indivial_i, :] = [ 4. 3. 132. 135.]
163
```

```
164
           cord_individul_obj[indivial_i, :] = [5. 5. 48. 53.]
165
          cord individul obj[indivial i, :] = [6. 6. 16. 22.]
          cord_individul_obj[indivial_i, :] = [7. 3. 8. 11.]
166
167
          cord_individul_obj[indivial_i, :] = [8. 3. 104. 107.]
168
          cord_individul_obj[indivial_i, :] = [ 9. 4. 44. 48.]
169
          cord_individul_obj[indivial_i, :] = [10. 6. 32. 38.]
170
          cord_individul_obj[indivial_i, :] = [11. 5. 56. 61.]
171
          cord_individul_obj[indivial_i, :] = [12. 3. 60. 63.]
172
          cord_individul_obj[indivial_i, :] = [13. 6. 54. 60.]
          cord_individul_obj[indivial_i, :] = [14. 3. 78. 81.]
173
174
175
        min(cord\_individul\_obj[:, 3]) = 11.0
        historl G best iter[iter, 3] = 11.0
176
177 Begin iteration:
178
179
          cord\_individul\_obj[indivial\_i, :] = [0. 3. 60. 63.]
180
          cord_individul_obj[indivial_i, :] = [ 1. 3. 62. 65.]
181
182
          cord_individul_obj[indivial_i, :] = [2. 6. 30. 36.]
183
          cord_individul_obj[indivial_i, :] = [3. 4. 68. 72.]
184
          cord_individul_obj[indivial_i, :] = [4. 3. 8. 11.]
          cord\_individul\_obj[indivial\_i, :] = [5. 6. 54. 60.]
185
186
          cord_individul_obj[indivial_i, :] = [6. 5. 32. 37.]
187
          cord individul obj[indivial i, :] = [7.5, 76, 81.]
188
          cord_individul_obj[indivial_i, :] = [8. 3. 52. 55.]
189
          cord_individul_obj[indivial_i, :] = [9. 3. 32. 35.]
          cord individul obj[indivial i, :] = [10. 4. 18. 22.]
190
191
          cord_individul_obj[indivial_i, :] = [11. 3. 56. 59.]
192
          cord_individul_obj[indivial_i, :] = [12. 6. 60. 66.]
193
          cord_individul_obj[indivial_i, :] = [13. 4. 50. 54.]
194
          cord_individul_iobj[indivial_i, :] = [14, 4, 44, 48]
195
196
        min(cord\_individul\_obj[:, 3]) = 11.0
197
        historl_G_best_iter[iter, 3] = 11.0
198 Begin iteration:
199
200 \text{ iter} = 8
201
          cord individul obi[indivial i, :] = [0.5.38.43.]
202
          cord_individul_obj[indivial_i, :] = [ 1. 5. 64. 69.]
203
          cord_individul_obj[indivial_i, :] = [ 2. 5. 128. 133.]
204
          cord_individul_obj[indivial_i, :] = [3. 4. 76. 80.]
205
          cord_individul_obj[indivial_i, :] = [ 4. 3. 162. 165.]
          cord\_individul\_obj[indivial\_i, :] = [5. 6. 8. 14.]
206
207
          cord_individul_obj[indivial_i, :] = [6. 4. 18. 22.]
208
          cord_individul_obj[indivial_i, :] = [7. 3. 8. 11.]
          cord_individul_obj[indivial_i, :] = [ 8. 3. 72. 75.]
209
210
          cord_individul_obj[indivial_i, :] = [9. 4. 38. 42.]
211
          cord_individul_obj[indivial_i, :] = [10. 6. 80. 86.]
          cord_individul_obj[indivial_i, :] = [11. 3. 78. 81.]
212
213
          cord_individul_obj[indivial_i, :] = [12. 6. 8. 14.]
214
          cord individul obj[indivial i, :] = [13. 6.28.34.]
          cord_individul_obj[indivial_i, :] = [14. 3. 88. 91.]
215
216
217
        min(cord\_individul\_obj[:, 3]) = 11.0
218
        historl\_G\_best\_iter[iter, 3] = 11.0
219 Begin iteration:
220
221 \text{ iter} = 9
222
          cord_individul_obj[indivial_i, :] = [0. 5. 56. 61.]
          cord_individul_obj[indivial_i, :] = [ 1. 3. 156. 159.]
223
224
          cord_individul_obj[indivial_i, :] = [ 2. 5. 76. 81.]
225
          cord_individul_obj[indivial_i, :] = [3. 4. 66. 70.]
226
          cord individul obj[indivial i, :] = \begin{bmatrix} 4 & 3 & 8 & 11 \end{bmatrix}
227
          cord_individul_obj[indivial_i, :] = [5. 6. 16. 22.]
228
          cord_individul_obj[indivial_i, :] = [6. 6. 30. 36.]
229
          cord_individul_obj[indivial_i, :] = [ 7. 5. 76. 81.]
230
          cord_individul_obj[indivial_i, :] = [ 8. 3. 112. 115.]
          cord individul_obj[indivial_i, :] = [ 9. 3. 52. 55.]
231
232
          cord_individul_obj[indivial_i, :] = [10. 6. 8. 14.]
233
          cord_individul_obj[indivial_i, :] = [11. 3. 36. 39.]
234
          cord_individul_obj[indivial_i, :] = [12. 3. 8. 11.]
235
          cord_individul_obj[indivial_i, :] = [ 13. 3. 176. 179.]
236
          cord_individul_obj[indivial_i, :] = [14. 5. 70. 75.]
237
238
        min(cord\_individul\_obj[:, 3]) = 11.0
239
        historl_G_best_iter[iter, 3] = 11.0
240 Begin iteration:
241
     iter = 10
242
243
          cord_individul_obj[indivial_i, :] = [0. 4. 86. 90.]
244
          cord individul obj[indivial i, :] = \begin{bmatrix} 1. & 3.106.109. \end{bmatrix}
          cord\_individul\_obj[indivial\_i, :] = [2. 6. 12. 18.]
245
246
          cord_individul_obj[indivial_i, :] = [3. 4. 66. 70.]
          cord_individul_obj[indivial_i, :] = [ 4. 3. 132. 135.]
247
```

```
248
          cord_individul_obj[indivial_i, :] = [5. 6. 32. 38.]
249
          cord individul obj[indivial i, :] = [6.5.18.23.]
          cord_individul_obj[indivial_i, :] = [7. 5. 76. 81.]
250
251
          cord_individul_obj[indivial_i, :] = [8. 4. 44. 48.]
252
          cord_individul_iobj[indivial_i, :] = [9. 4. 44. 48.]
253
          cord individul obj[indivial i, :] = [10. 4. 18. 22.]
          cord_individul_obj[indivial_i, :] = [11. 3. 72. 75.]
254
          cord_individul_obj[indivial_i, :] = [12. 6. 18. 24.]
255
256
          cord_individul_obj[indivial_i, :] = [13. 3. 8. 11.]
          cord_individul_obj[indivial_i, :] = [14. 4. 38. 42.]
257
258
259
        min(cord\_individul\_obj[:, 3]) = 11.0
        historl G best iter[iter, 3] = 11.0
260
261 Iteration calculate over
262
263
264
265
266
     All item are in Bin and:
267
        Bin area = 1080
        Real area = 78.0
268
        Proportion_of_area = 0.0722222222222222
269
270
          BEST_CHROM =
271
             berth: [ 2.5 26. 15. 20.5 6.5 10. ]
            time: [0. 0. 0. 0. 0. 0.]
272
273
            num_QC: [4. 2. 4. 2. 3. 4.]
274
        Objective function values and some other indicators:
275
          Obio = 3.00
                                Obj1 = 8.00
                                                      Obj0 + Obj1 = 11.00
276
          Total movement of crane: 8.00
277
          Total waiting time in berth position: 0.00
278
          Total index of q during berthing: 545.00
279
        Specific arrangement for each vessel:
280
           V_id: 0
                              li: 5.0
                                                  xi: 2.5
                                                                      bow of i: 0.0
                                                                                                 tail of i: 5.0
                                                                                                                         gama_i0: 0.0
                                                                                                                                                     gama_i1: 0.0
                    gama_i1 + 1: 1.0
                                                  gama_i1 - gama_i0: 0.0
                                                                                       duration_time_i: 1.0
                                                                                                                         demand_i: 80.0
                                                                                                                                                       work load_i:
                         work load gap_i: 0
281
          V_id: 1
                                                  xi: 26.0
                                                                        bow of i: 23.0
                                                                                                   tail of i: 29.0
                                                                                                                              gama_i0: 0.0
                                                                                                                                                          gama_i1: 2
                              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
          V_id: 2
                                                  xi: 15.0
                                                                        bow of i: 12.0
                                                                                                   tail of i: 18.0
                                                                                                                              gama_i0: 0.0
                                                                                                                                                          gama_i1: 3
                              1i: 6.0
                       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
          V_id: 3
283
                              li: 5.0
                                                  xi: 20.5
                                                                                                   tail of i: 23.0
                                                                                                                              gama i0: 0.0
                                                                        bow of i: 18.0
                                                                                                                                                          gama i1:1
                       gama_i1 + 1: 2.0
                                                                                                                            demand_i: 80.0
                                                    gama_i1 - gama_i0: 1.0
                                                                                         duration_time_i: 2.0
                                                                                                                                                          work
     load i: 80.0
                              work load gap_i: 0
284
                                                                                                                         gama_i0: 0.0
                                                                                                                                                     gama_i1: 3.0
           V_id: 4
                              li: 3.0
                                                  xi: 6.5
                                                                     bow of i: 5.0
                                                                                                 tail of i: 8.0
                    gama_i1 + 1: 4.0
                                                  gama_i1 - gama_i0: 3.0
                                                                                       duration_time_i: 4.0
                                                                                                                         demand i: 200.0
                                                                                                                                                       work load i:
     200.0
                         work load gap_i: 0
                                                                        bow of i: 8.0
285
           V_id: 5
                              li: 4.0
                                                  xi: 10.0
                                                                                                   tail of i: 12.0
                                                                                                                              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: 57 s
288 End
289
```