```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=11461
 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'])
 5
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 = 22
23
       maxIter_num = 10
24
       W inertia = 2.0
25
       oder_type_num = 10
26
       c1 = 1.0
       c2 = 2.0
27
28
       r1 = 0.416539851575108
29
       r2 = 0.416539851575108
30 Begin iteration:
31
32
   iter = 0
33
       cord individul obj[indivial i, :] = [0.6.78.84.]
       cord_individul_obj[indivial_i, :] = [ 1. 3. 128. 131.]
34
       cord_individul_obj[indivial_i, :] = [ 2. 4. 100. 104.]
35
36
       cord_individul_obj[indivial_i, :] = [ 3. 6. 94. 100.]
37
       cord_individul_obj[indivial_i, :] = [ 4. 6. 8. 14.]
       cord_individul_obj[indivial_i, :] = [5. 3. 52. 55.]
38
39
       cord_individul_obj[indivial_i, :] = [6. 3. 54. 57.]
40
       cord_individul_obj[indivial_i, :] = [7. 4. 70. 74.]
       cord individul_obj[indivial_i, :] = [8. 6. 16. 22.]
41
       cord_individul_obj[indivial_i, :] = [ 9. 6. 44. 50.]
42
43
44
     min(cord\ individul\ obi[:, 3]) = 14.0
45
     historl\_G\_best\_iter[iter, 3] = 14.0
46
   Begin iteration:
47
48 iter = 1
49
       cord_individul_obj[indivial_i, :] = [0. 4. 30. 34.]
50
       cord_individul_obj[indivial_i, :] = [1. 6. 8. 14.]
       cord_individul_obj[indivial_i, :] = [2. 4. 52. 56.]
51
       cord individul obj[indivial i, :] = [3. 6. 12. 18.]
52
53
       cord_individul_obj[indivial_i, :] = [4. 4. 20. 24.]
54
       cord_individul_obj[indivial_i, :] = [ 5. 6. 128. 134.]
       cord_individul_obj[indivial_i, :] = [6. 3. 18. 21.]
55
       cord_individul_obj[indivial_i, :] = [7. 6. 18. 24.]
56
       cord_individul_obj[indivial_i, :] = [ 8. 4. 56. 60.]
57
58
       cord individul obj[indivial i, :] = [9.6.28.34.]
59
60
     min(cord\_individul\_obj[:, 3]) = 14.0
     historl\_G\_best\_iter[iter, 3] = 14.0
62
   Begin iteration:
63
64
   iter = 2
       cord_individul_obj[indivial_i, :] = [ 0. 4. 76. 80.] cord_individul_obj[indivial_i, :] = [ 1. 4. 114. 118.]
65
66
67
       cord_individul_obj[indivial_i, :] = [ 2. 5. 108. 113.]
68
       cord_individul_obj[indivial_i, :] = [3. 6. 68. 74.]
       cord_individul_obj[indivial_i, :] = [4. 6. 14. 20.]
69
       cord_individul_obj[indivial_i, :] = [ 5. 6. 8. 14.]
70
71
       cord individul obj[indivial i, :] = [6.5.38.43.]
       cord_individul_obj[indivial_i, :] = [7. 4. 46. 50.]
73
       cord_individul_obj[indivial_i, :] = [ 8. 5. 40. 45.]
74
       cord_individul_obj[indivial_i, :] = [ 9. 5. 8. 13.]
75
76
     min(cord\ individul\ obj[:, 3]) = 13.0
     historl_G_best_iter[iter, 3] = 13.0
77
78 Begin iteration:
```

```
80 \text{ iter} = 3
 81
          cord_individul_obj[indivial_i, :] = [ 0. 6. 24. 30.]
          cord_individul_obj[indivial_i, :] = [ 1. 5. 8. 13.]
 82
 83
          cord_individul_obj[indivial_i, :] = [2. 6. 76. 82.]
 84
          cord_individul_obj[indivial_i, :] = [3. 6. 56. 62.]
 85
          cord_individul_obj[indivial_i, :] = [4. 4. 78. 82.]
          cord_individul_obj[indivial_i, :] = [5. 6. 12. 18.]
 86
 87
          cord_individul_obj[indivial_i, :] = [ 6. 6. 8. 14.]
 88
          cord_individul_obj[indivial_i, :] = [ 7. 4. 12. 16.]
          cord_individul_obj[indivial_i, :] = [ 8. 4. 38. 42.]
 89
 90
          cord_individul_obj[indivial_i, :] = [9. 5. 24. 29.]
 91
 92
        min(cord\ individul\ obj[:, 3]) = 13.0
 93
        historl\_G\_best\_iter[iter, 3] = 13.0
 94 Begin iteration:
 95
 96
     iter = 4
 97
          cord_individul_obj[indivial_i, :] = [0.5, 44, 49.]
          cord_individul_obj[indivial_i, :] = [ 1. 4. 48. 52.]
 98
 99
          cord_individul_obj[indivial_i, :] = [ 2. 5. 8. 13.]
100
          cord_individul_obj[indivial_i, :] = [3. 4. 74. 78.]
101
          cord_individul_obj[indivial_i, :] = [4. 5. 80. 85.]
102
          cord_individul_obj[indivial_i, :] = [ 5.
                                                    5. 120. 125.]
          cord individul obj[indivial i, :] = [6.5.38.43.]
103
          cord_individul_obj[indivial_i, :] = [ 7. 5. 104. 109.]
104
105
          cord_individul_obj[indivial_i, :] = [8. 5. 44. 49.]
          cord_individul_obj[indivial_i, :] = [ 9. 5. 24. 29.]
106
107
108
        min(cord\_individul\_obj[:, 3]) = 13.0
109
       historl_G_best_iter[iter, 3] = 13.0
110 Begin iteration:
111
112 \text{ iter} = 5
113
          cord_individul_obj[indivial_i, :] = [0. 4. 52. 56.]
          cord_individul_obj[indivial_i, :] = [1. 4. 48. 52.]
114
          cord_individul_obj[indivial_i, :] = [2. 4. 38. 42.]
115
116
          cord_individul_obj[indivial_i, :] = [3. 3. 48. 51.]
          cord_individul_obj[indivial_i, :] = [4. 5. 38. 43.]
117
118
          cord_individul_obj[indivial_i, :] = [ 5. 5. 8. 13.]
          cord_individul_obj[indivial_i, :] = [ 6. 3. 80. 83.]
119
120
          cord_individul_obj[indivial_i, :] = [ 7. 5. 108. 113.]
121
          cord_individul_obj[indivial_i, :] = [ 8. 4. 48. 52.]
          cord_individul_obj[indivial_i, :] = [9. 5. 24. 29.]
122
123
124
        min(cord\_individul\_obj[:, 3]) = 13.0
       historl G_{best_iter[iter, 3]} = 13.0
125
126 Begin iteration:
127
128 iter = 6
129
          cord_individul_obj[indivial_i, :] = [0. 5. 28. 33.]
          cord_individul_obj[indivial_i, :] = [1. 4. 78. 82.]
130
131
          cord_individul_obj[indivial_i, :] = [2. 5. 60. 65.]
132
          cord\_individul\_obj[indivial\_i, :] = [3. 5. 66. 71.]
          cord_individul_obj[indivial_i, :] = [4. 5. 70. 75.]
133
134
          cord_individul_obj[indivial_i, :] = [ 5. 3.116.119.]
135
          cord_individul_obj[indivial_i, :] = [6. 5. 34. 39.]
          cord individul obj[indivial i, :] = [7. 5. 8. 13.]
136
137
          cord_individul_obj[indivial_i, :] = [ 8. 5. 72. 77.]
138
          cord_individul_obj[indivial_i, :] = [9. 5. 24. 29.]
139
140
        min(cord\_individul\_obj[:, 3]) = 13.0
141
        historl\_G\_best\_iter[iter, 3] = 13.0
142 Begin iteration:
143
144 \text{ iter} = 7
145
          cord_individul_obj[indivial_i, :] = [0. 4. 86. 90.]
146
          cord\_individul\_obj[indivial\_i, :] = [1. 4.100.104.]
          cord\_individul\_obj[indivial\_i, :] = [2. 4. 8. 12.]
147
148
          cord_individul_obj[indivial_i, :] = [3. 4. 50. 54.]
149
          cord_individul_obj[indivial_i, :] = [4. 5. 24. 29.]
          cord_individul_obj[indivial_i, :] = [ 5. 5. 8. 13.]
150
151
          cord_individul_obj[indivial_i, :] = [6. 4. 30. 34.]
152
          cord_individul_obj[indivial_i, :] = [ 7. 5. 44. 49.]
          cord individul obj[indivial i, :] = [ 8. 4. 106. 110.]
153
154
          cord_individul_obj[indivial_i, :] = [ 9. 5. 8. 13.]
155
156
        min(cord\_individul\_obj[:, 3]) = 12.0
157
       historl_G_best_iter[iter, 3] = 12.0
158 Begin iteration:
159
160 \text{ iter} = 8
          cord_individul_obj[indivial_i, :] = [0. 4. 98. 102.]
161
162
          cord_individul_obj[indivial_i, :] = [1. 5. 28. 33.]
          cord_individul_obj[indivial_i, :] = [2. 4. 58. 62.]
163
```

```
164
          cord_individul_obj[indivial_i, :] = [3. 5. 16. 21.]
165
          cord individul obj[indivial i, :] = [4.5.20.25.]
          cord individul obj[indivial_i, :] = [5. 3. 86. 89.]
166
167
          cord_individul_obj[indivial_i, :] = [6. 4. 62. 66.]
168
          cord individul obj[indivial i, :] = [7. 5. 16. 21.]
169
          cord individul obj[indivial i, :] = [8. 4. 8. 12.]
170
          cord\_individul\_obj[indivial\_i, :] = [9.5.40.45.]
171
172
        min(cord\ individul\ obj[:, 3]) = 12.0
        historl_G_best_iter[iter, 3] = 12.0
173
174
     Begin iteration:
175
176 iter = 9
          cord\_individul\_obj[indivial\_i, :] = [0. 4. 8. 12.]
177
178
          cord_individul_obj[indivial_i, :] = [1. 6. 20. 26.]
179
          cord_individul_obj[indivial_i, :] = [2. 6. 48. 54.]
          cord individul_obj[indivial_i, :] = [ 3. 5. 58. 63.]
180
          cord individul_obj[indivial_i, :] = [4. 6. 58. 64.]
181
182
          cord_individul_obj[indivial_i, :] = [5. 4.38.42.]
183
          cord individul obj[indivial i, :] = [6.3.64.67.]
184
          cord_individul_obj[indivial_i, :] = [7. 4. 64. 68.]
          cord\_individul\_obj[indivial\_i, :] = [8. 6. 24. 30.]
185
186
          cord_individul_obj[indivial_i, :] = [9. 6. 8. 14.]
187
188
        min(cord\_individul\_obj[:, 3]) = 12.0
189
        historl_G_best_iter[iter, 3] = 12.0
190 Begin iteration:
191
     iter = 10
192
193
          cord_individul_obj[indivial_i, :] = [0. 4. 32. 36.]
194
          cord individul obj[indivial i, :] = [1. 6.28.34.]
195
          cord individul obj[indivial i, :] = [2. 4.38.42.]
196
          cord_individul_obj[indivial_i, :] = [3. 5. 34. 39.]
197
          cord_individul_obj[indivial_i, :] = [4. 4. 24. 28.]
          cord individul obj[indivial i, :] = [5. 4. 16. 20.]
198
199
          cord_individul_obj[indivial_i, :] = [6. 4. 58. 62.]
200
          cord_individul_obj[indivial_i, :] = [7. 4. 8. 12.]
          cord individul obj[indivial i, :] = [8.4, 24, 28]
201
202
          cord_individul_obj[indivial_i, :] = [ 9. 6. 12. 18.]
203
204
        min(cord\_individul\_obj[:, 3]) = 12.0
205
        historl G best_iter[iter, 3] = 12.0
206
     Iteration calculate over
207
208
209
210
211
     All item are in Bin and:
212
        Bin area = 1080
        Real\_area = 106.0
213
        Proportion of area = 0.09814814814814815
214
215
          BEST_CHROM =
216
             berth: [20.5 26. 11. 2.5 6.5 16.]
217
             time: [0. 0. 0. 0. 0. 0.]
218
            num_QC: [3. 2. 3. 2. 2. 3.]
219
        Objective function values and some other indicators:
                                Obj1 = 8.00
          Obj0 = 4.00
                                                       Obj0 + Obj1 = 12.00
220
          Total movement of crane: 8.00
221
222
           Total waiting time in berth position: 0.00
223
          Total index of q during berthing: 541.00
224
        Specific arrangement for each vessel:
           V_id: 0
225
                              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
226
          V_id: 1
                              li: 6.0
                                                  xi: 26.0
                                                                         bow of i: 23.0
                                                                                                    tail of i: 29.0
                                                                                                                                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: 120.0
                                                                                                                                                            work
     load i: 120.0
                                 work load gap_i: 0
                                                                                                                                gama i0: 0.0
227
                              li: 6.0
                                                  xi: 11.0
                                                                         bow of i: 8.0
                                                                                                    tail of i: 14.0
                                                                                                                                                            gama_i1: 4
           V_id: 2
                       gama i1 + 1: 5.0
                                                     gama_i1 - gama_i0: 4.0
                                                                                          duration_time_i: 5.0
                                                                                                                             demand i: 260.0
                                                                                                                                                            work
     load_i: 260.0
                                 work load gap_i: 0
228
           V_id: 3
                              1i: 5.0
                                                  xi: 2.5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 5.0
                                                                                                                           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:
                         work load gap_i: 0
229
           V id: 4
                              li: 3.0
                                                  xi: 6.5
                                                                      bow of i: 5.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama i0: 0.0
                                                                                                                                                      gama i1: 4.0
                    gama_i1 + 1: 5.0
                                                                                        duration_time_i: 5.0
                                                                                                                           demand\_i{:}\ 200.0
                                                  gama_i1 - gama_i0: 4.0
                                                                                                                                                         work load i:
     200.0
                         work load gap i: 0
230
           V_id: 5
                              li: 4.0
                                                  xi: 16.0
                                                                         bow of i: 14.0
                                                                                                    tail of i: 18.0
                                                                                                                                gama_i0: 0.0
                                                                                                                                                           gama_i1: 3
                       gama_i1 + 1: 4.0
                                                                                          duration_time_i: 4.0
                                                     gama_i1 - gama_i0: 3.0
                                                                                                                             demand_i: 220.0
                                                                                                                                                           work
     load i: 220.0
                                 work load gap i: 0
231
232
     Algorithm finished and the total CPU time: 36 s
233 End
234
```