```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=10187
 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 = 29
23
       maxIter_num = 10
24
       W inertia = 1.0
25
       oder_type_num = 10
26
       c1 = 2.0
       c2 = 1.0
27
28
       r1 = 0.3239655105992907
29
       r2 = 0.3239655105992907
30 Begin iteration:
31
32
   iter = 0
33
       cord individul obj[indivial i, :] = \begin{bmatrix} 0. & 4.106.110. \end{bmatrix}
       cord_individul_obj[indivial_i, :] = [ 1. 4. 108. 112.]
34
       cord\_individul\_obj[indivial\_i, :] = [2. 6.34.40.]
35
36
       cord_individul_obj[indivial_i, :] = [3. 6. 84. 90.]
37
       cord_individul_obj[indivial_i, :] = [ 4. 4. 8. 12.]
       cord_individul_obj[indivial_i, :] = [5. 4. 22. 26.]
38
39
       cord_individul_obj[indivial_i, :] = [6. 3. 80. 83.]
40
       cord_individul_obj[indivial_i, :] = [7. 4. 56. 60.]
       cord individul_obj[indivial_i, :] = [8. 5. 82. 87.]
41
       cord_individul_obj[indivial_i, :] = [ 9. 5. 60. 65.]
42
43
44
     min(cord\ individul\ obi[:, 3]) = 12.0
45
     historl_G_best_iter[iter, 3] = 12.0
46
   Begin iteration:
47
48 iter = 1
49
       cord_individul_obj[indivial_i, :] = [0. 4. 68. 72.]
50
       cord_individul_obj[indivial_i, :] = [ 1. 4. 8. 12.]
       cord_individul_obj[indivial_i, :] = [2. 4. 18. 22.]
51
       cord individul obj[indivial i, :] = [3. 6. 60. 66.]
52
53
       cord_individul_obj[indivial_i, :] = [4. 4. 32. 36.]
54
       cord_individul_obj[indivial_i, :] = [5. 4. 28. 32.]
       cord_individul_obj[indivial_i, :] = [6. 4. 44. 48.]
55
       cord_individul_obj[indivial_i, :] = [ 7. 6. 60. 66.]
56
       cord_individul_obj[indivial_i, :] = [8. 5. 18. 23.]
57
58
       cord individul obj[indivial i, :] = [9.5.48.53.]
59
     min(cord\_individul\_obj[:, 3]) = 12.0
60
     historl\_G\_best\_iter[iter, 3] = 12.0
62
   Begin iteration:
63
64
   iter = 2
       cord_individul_obj[indivial_i, :] = [ 0. 4. 8. 12.] cord_individul_obj[indivial_i, :] = [ 1. 4. 58. 62.]
65
66
67
       cord_individul_obj[indivial_i, :] = [2, 6, 16, 22]
68
       cord_individul_obj[indivial_i, :] = [3. 6. 80. 86.]
       cord_individul_obj[indivial_i, :] = [4. 5. 12. 17.]
69
70
       cord_individul_obj[indivial_i, :] = [5. 4. 8. 12.]
71
       cord_individul_obj[indivial_i, :] = [ 6. 6. 56. 62.]
       cord_individul_obj[indivial_i, :] = [ 7. 4. 140. 144.]
73
       cord_individul_obj[indivial_i, :] = [ 8. 4. 52. 56.]
74
       cord_individul_obj[indivial_i, :] = [ 9. 5. 52. 57.]
75
76
     min(cord\ individul\ obj[:, 3]) = 12.0
     historl_G_best_iter[iter, 3] = 12.0
77
78 Begin iteration:
```

```
80 iter = 3
 81
          cord_individul_obj[indivial_i, :] = [ 0. 4. 12. 16.]
          cord\_individul\_obj[indivial\_i, :] = [1. 4. 8. 12.]
 82
 83
          cord_individul_obj[indivial_i, :] = [2, 6, 12, 18]
 84
          cord individul obj[indivial i, :] = [3. 6.44.50.]
 85
          cord_individul_obj[indivial_i, :] = [4. 5. 16. 21.]
          cord_individul_obj[indivial_i, :] = [5. 4. 24. 28.]
 86
 87
          cord_individul_obj[indivial_i, :] = [6. 6. 72. 78.]
 88
          cord_individul_obj[indivial_i, :] = [ 7. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [ 8. 4. 76. 80.]
 89
 90
          cord_individul_obj[indivial_i, :] = [9. 5. 44. 49.]
 91
 92
        min(cord\ individul\ obj[:, 3]) = 12.0
 93
        historl\_G\_best\_iter[iter, 3] = 12.0
 94 Begin iteration:
 95
 96
     iter = 4
 97
          cord_individul_obj[indivial_i, :] = [0. 4. 12. 16.]
          cord_individul_obj[indivial_i, :] = [ 1. 4. 12. 16.]
 98
 99
          cord_individul_obj[indivial_i, :] = [ 2. 6. 16. 22.]
100
          cord_individul_obj[indivial_i, :] = [3. 4. 82. 86.]
101
          cord_individul_obj[indivial_i, :] = [4. 5. 30. 35.]
102
          cord_individul_obj[indivial_i, :] = [5. 4. 12. 16.]
103
          cord individul obj[indivial i, :] = [6.6.44.50.]
          cord_individul_obj[indivial_i, :] = [7. 6. 44. 50.]
104
105
          cord_individul_obj[indivial_i, :] = [ 8. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [9. 4. 30. 34.]
106
107
108
        min(cord\_individul\_obj[:, 3]) = 12.0
109
       historl\_G\_best\_iter[iter, 3] = 12.0
110 Begin iteration:
111
112 \text{ iter} = 5
          cord_individul_obj[indivial_i, :] = [0. 4. 8. 12.]
113
          cord individul_obj[indivial_i, :] = \begin{bmatrix} 1. & 4. & 8. & 12. \end{bmatrix}
114
          cord_individul_obj[indivial_i, :] = [ 2. 6. 52. 58.]
115
116
          cord_individul_obj[indivial_i, :] = [3. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [4. 5. 12. 17.]
117
118
          cord_individul_obj[indivial_i, :] = [ 5. 4. 8. 12.]
119
          cord_individul_obj[indivial_i, :] = [6. 6. 44. 50.]
120
          cord_individul_obj[indivial_i, :] = [7. 6. 12. 18.]
          cord_individul_obj[indivial_i, :] = [ 8. 4. 48. 52.]
121
          cord_individul_obj[indivial_i, :] = [9. 4. 12. 16.]
122
123
        min(cord\_individul\_obj[:, 3]) = 12.0
124
       historl G_{best_iter[iter, 3]} = 12.0
125
126 Begin iteration:
127
128 iter = 6
129
          cord\_individul\_obj[indivial\_i,:] = [\ 0.\ \ 5.\ 18.\ 23.]
          cord_individul_obj[indivial_i, :] = [1. 4. 34. 38.]
130
131
          cord_individul_obj[indivial_i, :] = [ 2. 4. 8. 12.]
132
          cord_individul_obj[indivial_i, :] = [3, 4, 12, 16]
          cord_individul_obj[indivial_i, :] = [4. 5. 18. 23.]
133
134
          cord_individul_obj[indivial_i, :] = [5. 4. 18. 22.]
135
          cord_individul_obj[indivial_i, :] = [6. 6. 12. 18.]
          cord individul obj[indivial i, :] = [7. 4. 12. 16.]
136
137
          cord_individul_obj[indivial_i, :] = [ 8. 4. 18. 22.]
138
          cord_individul_obj[indivial_i, :] = [9. 4. 24. 28.]
139
140
        min(cord\_individul\_obj[:, 3]) = 12.0
141
        historl\_G\_best\_iter[iter, 3] = 12.0
142 Begin iteration:
143
144 \text{ iter} = 7
145
          cord_individul_obj[indivial_i, :] = [0.5.18.23.]
146
          cord_individul_obj[indivial_i, :] = [1. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [2. 6. 8. 14.]
147
148
          cord_individul_obj[indivial_i, :] = [3. 4. 24. 28.]
149
          cord_individul_obj[indivial_i, :] = [4. 5. 18. 23.]
150
          cord_individul_obj[indivial_i, :] = [5. 4. 18. 22.]
151
          cord\_individul\_obj[indivial\_i, :] = [6. 6. 8. 14.]
152
          cord_individul_obj[indivial_i, :] = [7. 6. 8. 14.]
          cord individul obj[indivial i, :] = [8.4.18.22.]
153
154
          cord_individul_obj[indivial_i, :] = [ 9. 4. 18. 22.]
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. 5. 8. 13.]
161
162
          cord_individul_obj[indivial_i, :] = [1. 4. 34. 38.]
          cord_individul_obj[indivial_i, :] = [2. 6. 18. 24.]
163
```

```
164
          cord_individul_obj[indivial_i, :] = [3. 4. 8. 12.]
165
          cord individul obj[indivial i, :] = [4. 4. 18. 22.]
          cord individul_obj[indivial_i, :] = [5. 4. 8. 12.]
166
167
          cord_individul_obj[indivial_i, :] = [6. 6. 8. 14.]
168
          cord individul obj[indivial i, :] = [7. 3. 58. 61.]
169
          cord individul obj[indivial i, :] = [8.4.18.22.]
170
          cord_individul_obj[indivial_i, :] = [ 9. 4. 24. 28.]
171
172
        min(cord\ individul\ obj[:, 3]) = 12.0
        historl_G_best_iter[iter, 3] = 12.0
173
174
     Begin iteration:
175
176 \text{ iter} = 9
          cord\_individul\_obj[indivial\_i, :] = [0. 4. 8. 12.]
177
178
          cord_individul_obj[indivial_i, :] = [ 1. 4. 8. 12.]
179
          cord_individul_obj[indivial_i, :] = [2. 6. 12. 18.]
          cord individul_obj[indivial_i, :] = [3. 4. 18. 22.]
180
          cord individul_obj[indivial_i, :] = [4. 4. 18. 22.]
181
182
          cord_individul_obj[indivial_i, :] = [5. 4. 8. 12.]
183
          cord individul obj[indivial i, :] = [6. 4. 12. 16.]
184
          cord_individul_obj[indivial_i, :] = [7. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [ 8. 4. 12. 16.]
185
186
          cord_individul_obj[indivial_i, :] = [9. 4. 20. 24.]
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. 8. 12.]
194
          cord individul obi[indivial i, :] = [1. 4. 18. 22.]
195
          cord individul obj[indivial i, :] = [2. 4. 14. 18.]
196
          cord_individul_obj[indivial_i, :] = [3. 4. 24. 28.]
197
          cord_individul_obj[indivial_i, :] = [4. 5. 56. 61.]
          cord individul obj[indivial i, :] = [5. 4. 8. 12.]
198
199
          cord_individul_obj[indivial_i, :] = [6. 6. 8. 14.]
200
          cord_individul_obj[indivial_i, :] = [7. 6. 16. 22.]
          cord individul obj[indivial i, :] = [8.4, 28, 32.]
201
202
          cord_individul_obj[indivial_i, :] = [ 9. 4. 8. 12.]
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 = 95.0
213
214
        Proportion of area = 0.08796296296296297
215
          BEST CHROM =
216
             berth: [20.5 26. 10. 15.5 1.5 5.]
217
             time: [0. 0. 0. 0. 0. 0.]
218
            num_QC: [2. 2. 3. 2. 2. 3.]
219
        Objective function values and some other indicators:
                                 Obj1 = 8.00
          Obj0 = 4.00
                                                       Obj0 + Obj1 = 12.00
220
221
          Total movement of crane: 8.00
222
           Total waiting time in berth position: 0.00
          Total index of q during berthing: 408.00
223
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
                                                                                                                              demand_i: 120.0
                                                                                           duration_time_i: 3.0
                                                                                                                                                            work
     load i: 120.0
                                 work load gap_i: 0
227
                              li: 6.0
                                                  xi: 10.0
                                                                         bow of i: 7.0
                                                                                                    tail of i: 13.0
                                                                                                                                gama i0: 0.0
           V_id: 2
                                                                                                                                                            gama_i1: 4
                       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: 15.5
                                                                         bow of i: 13.0
                                                                                                    tail of i: 18.0
                                                                                                                                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
229
           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: 4.0
                    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
230
           V_id: 5
                              li: 4.0
                                                  xi: 5.0
                                                                       bow of i: 3.0
                                                                                                  tail of i: 7.0
                                                                                                                           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: 220.0
                                                                                                                                                          work load i:
     220.0
                         work load gap_i: 0
231
232
     Algorithm finished and the total CPU time: 54 s
233
    End
234
```