```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=27386
 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 = 14
23
       maxIter num = 10
24
       W inertia = 1.5
25
       oder_type_num = 10
26
       c1 = 1.5
       c2 = 1.0
27
28
       r1 = 0.8377072006307665
29
       r2 = 0.8377072006307665
30 Begin iteration:
31
32
   iter = 0
33
       cord individul obj[indivial i, :] = \begin{bmatrix} 0. & 4.100.104. \end{bmatrix}
       cord_individul_obj[indivial_i, :] = [1. 5. 38. 43.]
34
       cord_individul_obj[indivial_i, :] = [ 2. 5. 18. 23.]
35
36
       cord_individul_obj[indivial_i, :] = [3. 5. 28. 33.]
37
       cord_individul_obj[indivial_i, :] = [ 4. 5. 48. 53.]
       cord_individul_obj[indivial_i, :] = [5. 5. 28. 33.]
38
39
       cord_individul_obj[indivial_i, :] = [6. 5. 80. 85.]
40
       cord_individul_obj[indivial_i, :] = [7. 5. 48. 53.]
       cord individul_obj[indivial_i, :] = [8. 4. 18. 22.]
41
       cord_individul_obj[indivial_i, :] = [ 9. 4. 54. 58.]
42
43
44
     min(cord\ individul\ obi[:, 3]) = 22.0
45
     historl_G_best_iter[iter, 3] = 22.0
46
   Begin iteration:
47
48 iter = 1
49
       cord_individul_obj[indivial_i, :] = [0. 4. 18. 22.]
50
       cord_individul_obj[indivial_i, :] = [1. 4. 86. 90.]
       cord_individul_obj[indivial_i, :] = [2. 4. 8. 12.]
51
       cord individul obj[indivial i, :] = [3. 6. 16. 22.]
52
53
       cord_individul_obj[indivial_i, :] = [4. 5. 30. 35.]
54
       cord_individul_obj[indivial_i, :] = [5. 4. 64. 68.]
       cord_individul_obj[indivial_i, :] = [6. 4. 38. 42.]
55
       cord_individul_obj[indivial_i, :] = [7. 4. 48. 52.]
56
       cord_individul_obj[indivial_i, :] = [ 8. 5. 18. 23.]
57
58
       cord individul obj[indivial i, :] = [9. 4.40.44.]
59
60
     min(cord\_individul\_obj[:, 3]) = 12.0
     historl\_G\_best\_iter[iter, 3] = 12.0
62
   Begin iteration:
63
64
   iter = 2
       cord_individul_obj[indivial_i, :] = [ 0. 5. 16. 21.]
65
       cord individul_obj[indivial_i, :] = \begin{bmatrix} 1. & 4. & 8. & 12. \end{bmatrix}
66
67
       cord_individul_obj[indivial_i, :] = [ 2. 6. 100. 106.]
68
       cord_individul_obj[indivial_i, :] = [3. 6. 8. 14.]
       cord_individul_obj[indivial_i, :] = [ 4. 5. 128. 133.]
69
70
       cord_individul_obj[indivial_i, :] = [5. 4. 50. 54.]
71
       cord_individul_obj[indivial_i, :] = [6. 5. 32. 37.]
       cord_individul_obj[indivial_i, :] = [7. 4. 72. 76.]
73
       cord_individul_obj[indivial_i, :] = [8. 5. 26. 31.]
74
       cord_individul_obj[indivial_i, :] = [ 9. 6. 16. 22.]
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. 6. 8. 14.]
          cord_individul_obj[indivial_i, :] = [1. 4. 20. 24.]
 82
 83
          cord_individul_obj[indivial_i, :] = [2. 6. 8. 14.]
 84
          cord individul obj[indivial i, :] = [3. 6. 18. 24.]
 85
          cord_individul_obj[indivial_i, :] = [ 4. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [5. 4. 8. 12.]
 86
 87
          cord_individul_obj[indivial_i, :] = [ 6. 4. 18. 22.]
 88
          cord_individul_obj[indivial_i, :] = [7. 4. 80. 84.]
          cord_individul_obj[indivial_i, :] = [ 8. 5. 12. 17.]
 89
 90
          cord_individul_obj[indivial_i, :] = [9. 4. 12. 16.]
 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. 6. 94. 100.]
          cord_individul_obj[indivial_i, :] = [1. 4. 28. 32.]
 98
 99
          cord_individul_obj[indivial_i, :] = [ 2. 6. 26. 32.]
100
          cord_individul_obj[indivial_i, :] = [ 3. 6. 94. 100.]
          cord_individul_obj[indivial_i, :] = [ 4. 5. 12. 17.]
101
102
          cord_individul_obj[indivial_i, :] = [5. 5. 8. 13.]
          cord individul obj[indivial i, :] = [6.5.12.17.]
103
          cord_individul_obj[indivial_i, :] = [7. 4. 8. 12.]
104
105
          cord_individul_obj[indivial_i, :] = [ 8. 5. 12. 17.]
          cord_individul_obj[indivial_i, :] = [9. 4. 12. 16.]
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, :] = [1. 4. 20. 24.]
114
          cord_individul_obj[indivial_i, :] = [ 2. 6. 70. 76.]
115
116
          cord_individul_obj[indivial_i, :] = [3. 6. 48. 54.]
          cord individul obj[indivial i, :] = [4.5.26.31.]
117
118
          cord_individul_obj[indivial_i, :] = [ 5. 5. 8. 13.]
119
          cord_individul_obj[indivial_i, :] = [6.5.56.61.]
120
          cord_individul_obj[indivial_i, :] = [7. 4. 24. 28.]
          cord_individul_obj[indivial_i, :] = [ 8. 5. 12. 17.]
121
          cord_individul_obj[indivial_i, :] = [ 9. 6. 12. 18.]
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
          cord\_individul\_obj[indivial\_i, :] = [0.5.16.21.]
129
          cord_individul_obj[indivial_i, :] = [1. 4. 28. 32.]
130
131
          cord_individul_obj[indivial_i, :] = [2. 4. 8. 12.]
132
          cord_individul_obj[indivial_i, :] = [ 3. 4. 18. 22.]
          cord_individul_obj[indivial_i, :] = [ 4. 5. 124. 129.]
133
134
          cord_individul_obj[indivial_i, :] = [5. 5. 8. 13.]
135
          cord_individul_obj[indivial_i, :] = [6. 4. 12. 16.]
          cord individul obj[indivial i, :] = [7. 4. 34. 38.]
136
137
          cord_individul_obj[indivial_i, :] = [ 8. 5. 12. 17.]
138
          cord_individul_obj[indivial_i, :] = [9. 4. 12. 16.]
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, :] = [0.5.62.67.]
146
          cord_individul_obj[indivial_i, :] = [1. 4. 52. 56.]
          cord_individul_obj[indivial_i, :] = [ 2. 6. 48. 54.]
147
148
          cord_individul_obj[indivial_i, :] = [3. 4. 8. 12.]
149
          cord_individul_obj[indivial_i, :] = [4. 4. 8. 12.]
150
          cord_individul_obj[indivial_i, :] = [5. 4. 8. 12.]
151
          cord_individul_obj[indivial_i, :] = [6. 5. 12. 17.]
152
          cord_individul_obj[indivial_i, :] = [7. 4. 34. 38.]
          cord individul obj[indivial i, :] = [8.5, 12, 17.]
153
154
          cord_individul_obj[indivial_i, :] = [ 9. 6. 12. 18.]
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. 8. 12.]
161
162
          cord_individul_obj[indivial_i, :] = [1. 4. 38. 42.]
          cord_individul_obj[indivial_i, :] = [2. 6. 58. 64.]
163
```

```
164
          cord_individul_obj[indivial_i, :] = [ 3. 6. 96. 102.]
165
          cord individul obj[indivial i, :] = [4.5.30.35.]
          cord individul_obj[indivial_i, :] = [5. 5. 8. 13.]
166
167
          cord_individul_obj[indivial_i, :] = [6. 4. 12. 16.]
168
          cord individul obj[indivial i, :] = [7. 4. 12. 16.]
169
          cord individul obj[indivial i, :] = [8.5.8.13.]
170
          cord_individul_obj[indivial_i, :] = [ 9. 4. 28. 32.]
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. 5. 32. 37.]
177
178
          cord_individul_obj[indivial_i, :] = [ 1. 4. 18. 22.]
179
          cord_individul_obj[indivial_i, :] = [2. 4. 18. 22.]
          cord individul_obj[indivial_i, :] = [ 3. 4. 8. 12.]
180
          cord individul_obj[indivial_i, :] = [ 4. 4. 42. 46.]
181
182
          cord_individul_obj[indivial_i, :] = [5. 5. 18. 23.]
183
          cord individul obj[indivial i, :] = [6.5.34.39.]
184
          cord_individul_obj[indivial_i, :] = [7. 4. 30. 34.]
          cord_individul_obj[indivial_i, :] = [8. 5. 8. 13.]
185
186
          cord_individul_obj[indivial_i, :] = [9. 4. 8. 12.]
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. 24. 28.]
194
          cord_individul_iobj[indivial_i, :] = [1. 4. 44. 48.]
195
          cord individul obj[indivial i, :] = [2. 4.58.62.]
196
          cord_individul_obj[indivial_i, :] = [3. 6. 96. 102.]
197
          cord_individul_obj[indivial_i, :] = [4. 4. 8. 12.]
          cord individul obj[indivial i, :] = [5.5.8.13.]
198
199
          cord_individul_obj[indivial_i, :] = [6. 5. 18. 23.]
200
          cord_individul_obj[indivial_i, :] = [7. 4.38.42.]
          cord individul obj[indivial i, :] = \begin{bmatrix} 8.5.8.13. \end{bmatrix}
201
202
          cord_individul_obj[indivial_i, :] = [ 9. 6. 16. 22.]
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 = 101.0
213
214
        Proportion of area = 0.09351851851851851
215
          BEST_CHROM =
             berth: [20.5 26. 3. 12.5 16.5 8.]
216
217
             time: [0. 0. 0. 0. 0. 0.]
218
            num_QC: [3. 2. 3. 4. 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
223
          Total index of q during berthing: 493.00
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
                                                  xi: 26.0
          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
                                                     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
227
                              li: 6.0
                                                                       bow of i: 0.0
                                                                                                  tail of i: 6.0
                                                                                                                           gama i0: 0.0
                                                                                                                                                       gama i1: 4.0
           V_id: 2
                                                  xi: 3.0
                    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
                                                  xi: 12.5
          V_id: 3
                                                                         bow of i: 10.0
                                                                                                    tail of i: 15.0
                                                                                                                                gama i0: 0.0
                                                                                                                                                            gama_i1: 0
                              li: 5.0
      0
                       gama_i1 + 1: 1.0
                                                     gama_i1 - gama_i0: 0.0
                                                                                           duration_time_i: 1.0
                                                                                                                              demand_i: 80.0
                                                                                                                                                            work
     load_i: 80.0
                              work load gap_i: 0
                                                  xi: 16.5
229
           V_id: 4
                              li: 3.0
                                                                         bow of i: 15.0
                                                                                                    tail of i: 18.0
                                                                                                                                gama i0: 0.0
                                                                                                                                                            gama i1:4
                                                     gama_i1 - gama_i0: 4.0
                       gama_i1 + 1: 5.0
                                                                                           duration_time_i: 5.0
      0
                                                                                                                              demand_i: 200.0
                                                                                                                                                            work
     load_i: 200.0
                                 work load gap i: 0
230
           V_id: 5
                              li: 4.0
                                                  xi: 8.0
                                                                       bow of i: 6.0
                                                                                                  tail of i: 10.0
                                                                                                                              gama_i0: 0.0
                                                                                                                                                         gama_i1: 3.0
                    gama_i1 + 1: 4.0
                                                                                                                                                         work load_i:
                                                  gama_i1 - gama_i0: 3.0
                                                                                        duration_time_i: 4.0
                                                                                                                           demand_i: 220.0
     220.0
                         work load gap_i: 0
231
232
     Algorithm finished and the total CPU time: 35 s
233
    End
234
```