```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=5981
3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   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
  python code/01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
   Waiting 1s.....
12
13
  This is the R_2_1 _standard_test.xlsx optimization process solved by ENSGA-II algorithm.
14
15
   Start
16
17
   Before iteration:
18
     Read basic data
19
     Parameter setting:
       trail = 22
20
21
       Pop\_size = 10
       Tolerance iteration unchanged number = 10
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.75
26
       Crossover rate = 0.85
       Mutation rate = 0.75
27
28
       Mu_oper_type = 2
29
       vessel\_move\_way = 1
30
       coefficient for Obj1= 0.5
       coefficient for Obj2= 1.5
31
       gen = 0
32
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
     obj[0] = 8.00 temp_best_value_gen = 8.00
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 8.00 temp_best_value_gen = 8.00
41
     No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [2. 8.]
       second level: [0, 4,]
44
       third level: [2. 6.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 8.00 temp_best_value_gen = 8.00
49
50
     No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [2. 8.]
52
53
       second level: [0. 4.]
54
       third level: [2. 6.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 8.00 temp best value gen = 8.00
59
     No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 3
60
     solution chromosome =
61
       first level: [ [2. 8.]
62
       second level: [0. 4.]
       third level: [2. 6.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 8.00 temp_best_value_gen = 8.00
68
     No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 4
69
     solution chromosome =
70
       first level: [ [2. 8.]
71
       second level: [0. 4.]
       third level: [2. 6.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 8.00 temp best value gen = 8.00
76
     No, maintain solution and obj[gen] = 8.00, and the tolerance counter = 5
77
78
     solution chromosome =
       first level: [ [2. 8.]
```

```
unknown
  80
           second level: [0, 4,]
  81
           third level: [2. 6.]]
  82
        The No. 5 iteration is finished!
  83
      Beging the No. 6 iteration:
  85
        obj[gen-1] = 8.00 temp best value gen = 8.00
        No, maintain solution and obj[gen] = \overline{8.00}, and the tolerance_counter = 6
  86
  87
        solution chromosome =
  88
           first level: [ [2. 8.]
  89
           second level: [0, 4,]
  90
           third level: [2. 6.]]
  91
        The No. 6 iteration is finished!
  92
  93 Beging the No. 7 iteration:
        obj[gen-1] = 8.00 temp_best_value_gen = 8.00
  94
  95
        No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 7
  96
        solution chromosome =
  97
           first level: [ [2. 8.]
  98
           second level: [0. 4.]
 99
           third level: [2. 6.]]
100
        The No. 7 iteration is finished!
101
102
      Beging the No. 8 iteration:
        obj[gen-1] = 8.00 temp best value gen = 8.00
103
        No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 8
104
105
        solution chromosome =
106
           first level: [ [2. 8.]
107
           second level: [0. 4.]
           third level: [2. 6.]]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 8.00 temp_best_value_gen = 8.00
113
        No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 9
114
        solution chromosome =
115
           first level: [ [2. 8.]
116
           second level: [0. 4.]
           third level: [2, 6,]]
117
        The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 8.00 temp_best_value_gen = 8.00
121
        No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 10
122
123
        solution chromosome =
124
           first level: [ [2. 8.]
125
           second level: [0, 4.]
126
           third level: [2. 6.]]
127
        The No. 10 iteration is finished!
128
129
130
131 The iteration is terminated and then visulize the solution:
132
        solution chromosome =
          first level: [ [2. 8.]
133
134
           second level: [0. 4.]
135
           third level: [2. 6.]]
136
        Objective function values and some other indicators:
137
           Obj0 = 4.00
                                 Obj1 = 4.00
                                                       Obj0 + Obj1 = 8.00
138
           Total movement of crane: 0.00
139
           Total waiting time in berth position: 4.00
140
           Total index of q during berthing: 43.00
141
        Specific arrangement for each vessel:
                              li: 4.0
                                                                      bow of i: 0.0
                                                                                                                          gama i0: 0.0
142
           V_id: 0
                                                                                                 tail of i: 4.0
                                                                                                                                                      gama i1: 4.0
                    duration_time_i: 4.0
                                                       demand_i: 160.0
                                                                                     work load_i: 160.0
                                                                                                                     work load gap_i: 0
143
           V_id: 1
                                                                      bow of i: 4.0
                                                                                                                             gama_i0: 4.0
                              li: 8.0
                                                  xi: 8.0
                                                                                                 tail of i: 12.0
                                                                                                                                                        gama_i1: 5.0
                     duration_time_i: 1.0
                                                       demand_i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                      work load gap_i: 0
145 Algorithm finished and the total CPU time: 82 s
146 End
147
```