```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=3711
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.
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 = 39
20
21
       Pop\_size = 20
       Tolerance iteration unchanged number = 5
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.85
26
       Crossover rate = 0.75
       Mutation rate = 0.85
27
28
       Mu_oper_type = 1
29
       vessel_move_way = 2
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] = 13.50 temp_best_value_gen = 13.50
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 13.50 temp_best_value_gen = 13.50
41
     No, maintain solution and obj[gen] = 13.50, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [2. 8.]
       second level: [1, 6.]
44
       third level: [3. 7.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 13.50 temp_best_value_gen = 13.50
49
50
     No, maintain solution and obj[gen] = 13.50, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [2. 8.]
52
       second level: [1. 6.]
53
54
       third level: [3. 7.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 13.50 temp best value gen = 4.50
59
     Yes, update solution and obj[gen] = 4.50
60
     solution chromosome =
61
       first level: [ [2. 8.]
62
       second level: [1.1.]
       third level: [3. 7.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 4.50 temp_best_value_gen = 4.50
68
     No, maintain solution and obj[gen] = 4.50, and the tolerance_counter = 1
69
     solution chromosome =
70
       first level: [ [2. 8.]
       second level: [1. 1.]
71
       third level: [3. 7.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 4.50 temp_best_value_gen = 4.50
76
     No, maintain solution and obj[gen] = 4.50, and the tolerance counter = 2
77
78
     solution chromosome =
       first level: [ [2. 8.]
```

```
unknown
  80
           second level: [1, 1,]
 81
           third level: [3. 7.]]
  82
        The No. 5 iteration is finished!
 83
      Beging the No. 6 iteration:
        obj[gen-1] = 4.50 temp best value gen = 4.50
  85
        No, maintain solution and obj[gen] = 4.50, and the tolerance_counter = 3
  86
  87
        solution chromosome =
  88
           first level: [ [2. 8.]
           second level: [1, 1,]
  89
  90
           third level: [3. 7.]]
  91
        The No. 6 iteration is finished!
  92
  93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 4.50 temp_best_value_gen = 4.50
  95
        No, maintain solution and obj[gen] = 4.50, and the tolerance_counter = 4
  96
        solution chromosome =
 97
           first level: [ [2. 8.]
 98
           second level: [1. 1.]
           third level: [3. 7.]]
 99
100
        The No. 7 iteration is finished!
101
102
      Beging the No. 8 iteration:
        obj[gen-1] = 4.50 temp best value gen = 4.50
103
104
        No, maintain solution and obj[gen] = 4.50, and the tolerance_counter = 5
105
        solution chromosome =
106
           first level: [ [2. 8.]
107
           second level: [1.1.]
           third level: [3. 7.]]
108
109
        The No. 8 iteration is finished!
110
111
112
113 The iteration is terminated and then visulize the solution:
114
        solution chromosome =
115
           first level: [ [2. 8.]
116
           second level: [1. 1.]
117
           third level: [3, 7.]]
118
        Objective function values and some other indicators:
                                 Obj1 = 2.00
                                                       Obj0 + Obj1 = 5.00
119
           Obj0 = 3.00
           Total movement of crane: 0.00
120
           Total waiting time in berth position: 2.00
121
           Total index of q during berthing: 46.00
122
123
        Specific arrangement for each vessel:
124
                              li: 4.0
                                                                      bow of i: 0.0
                                                                                                 tail of i: 4.0
           V_id: 0
                                                  xi: 2.0
                                                                                                                          gama_i0: 1.0
                                                                                                                                                     gama_i1: 4.0
                     duration_time_i: 3.0
                                                       demand_i: 160.0
                                                                                     work load_i: 160.0
                                                                                                                     work load gap_i: 0
125
                                                                      bow of i: 4.0
                                                                                                 tail of i: 12.0
                                                                                                                            gama_i0: 1.0
           V_id: 1
                              li: 8.0
                                                  xi: 8.0
                                                                                                                                                        gama_i1: 2.0
                     duration_time_i: 1.0
                                                       demand_i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                     work load gap_i: 0
     Algorithm finished and the total CPU time: 139 s
127
128 End
129
```