```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=6132
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 = 23
20
21
       Pop\_size = 20
       Tolerance iteration unchanged number = 5
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.8
       Mutation rate = 0.75
27
28
       Mu_oper_type = 2
29
       vessel\_move\_way = 1
30
       coefficient for Obj1= 1.5
       coefficient for Obj2= 0.5
31
32
       gen = 0
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
36
     obj[0] = 10.88 temp_best_value_gen = 10.88
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 10.88 temp_best_value_gen = 7.67
     Yes, update solution and obj[gen] = 7.67
41
     solution chromosome =
42
43
       first level: [ [2.08 4.17]
       second level: [0, 2,]
44
       third level: [4. 3.]]
45
     The No. 1 iteration is finished!
46
47
   Beging the No. 2 iteration:
obj[gen-1] = 7.67 temp_best_value_gen = 7.18
48
49
50
     Yes, update solution and obj[gen] = 7.18
51
     solution chromosome =
52
       first level: [ [2.42 4.05]
       second level: [1. 0.]
53
54
       third level: [3. 7.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 7.18 temp best value gen = 7.17
     Yes, update solution and obj[gen] = 7.17
59
60
     solution chromosome =
61
       first level: [ [2.12 4.06]
62
       second level: [2. 0.]
       third level: [4. 7.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 7.17 temp_best_value_gen = 7.17
68
     No, maintain solution and obj[gen] = 7.17, and the tolerance_counter = 1
69
     solution chromosome =
70
       first level: [ [2.12 4.06]
71
       second level: [2. 0.]
       third level: [4. 7.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 7.17 temp best value gen = 7.17
76
     No, maintain solution and obj[gen] = 7.17, and the tolerance_counter = 2
77
78
     solution chromosome =
       first level: [ [2.12 4.06]
```

```
80
           second level: [2. 0.]
 81
          third level: [4. 7.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
        obj[gen-1] = 7.17 temp_best_value_gen = 7.17
No, maintain solution and obj[gen] = 7.17, and the tolerance_counter = 3
 85
 86
 87
        solution chromosome =
 88
          first level: [[2.12 4.06]
          second level: [2. 0.]
 89
 90
          third level: [4. 7.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 7.17 temp_best_value_gen = 7.17
 95
        No, maintain solution and obj[gen] = 7.17, and the tolerance_counter = 4
 96
        solution chromosome =
 97
          first level: [ [2.12 4.06]
 98
          second level: [2. 0.]
 99
          third level: [4. 7.]]
100
        The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
        obj[gen-1] = 7.17 temp best value gen = 7.17
103
104
        No, maintain solution and obj[gen] = 7.17, and the tolerance_counter = 5
105
        solution chromosome =
106
          first level: [ [2.12 4.06]
          second level: [2. 0.] third level: [4. 7.]]
107
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: [ [2.12 4.06]
116
           second level: [2. 0.]
117
          third level: [4. 7.]
118
        Objective function values and some other indicators:
                                                         Obj0 + Obj1 = 8.34
119
          Obj0 = 3.00
                                 Obj1 = 5.34
          Total movement of crane: 3.34
120
          Total waiting time in berth position: 2.00
121
          Total index of q during berthing: 27.00
122
123
        Specific arrangement for each vessel:
124
                               li: 4.0
                                                                        bow of i: 0.1
                                                                                                    tail of i: 4.1
                                                                                                                              gama_i0: 2.0
           V_id: 0
                                                    xi: 2.1
                                                                                                                                                           gama_i1: 4.0
                     duration\_time\_i{:}~2.0
                                                                                                                         work load gap_i: 0
                                                         demand_i: 160.0
                                                                                        work load_i: 160.0
125
                                                                        bow of i: 0.1
                                                                                                     tail of i: 8.1
                                                                                                                              gama_i0: 0.0
          V_id: 1
                               li: 8.0
                                                    xi: 4.1
                                                                                                                                                           gama_i1: 1.0
                     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: 134 s
127
128 End
129
```