```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=6359
2
3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   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
  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 = 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
       gen = 0
32
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
36
     obj[0] = 14.51 temp_best_value_gen = 14.51
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 14.51 temp_best_value_gen = 14.51
41
     No, maintain solution and obj[gen] = 14.51, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [2.13 5.2 ]
       second level: [1, 4.]
44
       third level: [3. 4.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 14.51 temp_best_value_gen = 9.41
49
50
     Yes, update solution and obj[gen] = 9.41
51
     solution chromosome =
52
       first level: [ [2.12 4.13]
53
       second level: [1. 0.]
54
       third level: [2. 8.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 9.41 temp best value gen = 9.41
59
     No, maintain solution and obj[gen] = 9.41, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [2.12 4.13]
62
       second level: [1. 0.]
       third level: [2. 8.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 9.41 temp_best_value_gen = 9.41
68
     No, maintain solution and obj[gen] = 9.41, and the tolerance_counter = 2
69
     solution chromosome =
70
       first level: [ [2.12 4.13]
       second level: [1. 0.]
71
       third level: [2. 8.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 9.41 temp best value gen = 9.41
76
     No, maintain solution and obj[gen] = 9.41, and the tolerance counter = 3
77
78
     solution chromosome =
       first level: [ [2.12 4.13]
```

```
unknown
  80
            second level: [1. 0.]
 81
           third level: [2. 8.]]
  82
         The No. 5 iteration is finished!
 83
      Beging the No. 6 iteration:
        obj[gen-1] = 9.41 temp_best_value_gen = 9.41
No, maintain solution and obj[gen] = 9.41, and the tolerance_counter = 4
  85
  86
  87
         solution chromosome =
  88
           first level: [ [2.12 4.13]
           second level: [1, 0.]
  89
  90
           third level: [2. 8.]]
 91
         The No. 6 iteration is finished!
  92
  93 Beging the No. 7 iteration:
  94
         obj[gen-1] = 9.41 temp_best_value_gen = 9.41
  95
         No, maintain solution and obj[gen] = 9.41, and the tolerance_counter = 5
  96
         solution chromosome =
 97
           first level: [ [2.12 4.13]
 98
           second level: [1. 0.]
 99
           third level: [2. 8.]]
100
         The No. 7 iteration is finished!
101
102
103
104 The iteration is terminated and then visulize the solution:
105
         solution chromosome =
106
           first level: [ [2.12 4.13]
           second level: [1. 0.] third level: [2. 8.]]
107
108
109
         Objective function values and some other indicators:
110
           0bi0 = 4.00
                                 Obj1 = 6.83
                                                         Obj0 + Obj1 = 10.83
           Total movement of crane: 5.83
111
112
           Total waiting time in berth position: 1.00
113
           Total index of q during berthing: 19.00
114
         Specific arrangement for each vessel:
115
                                li: 4.0
                                                    xi: 2.1
                                                                         bow of i: 0.1
                                                                                                     tail of i: 4.1
                                                                                                                               gama_i0: 1.0
                                                                                                                                                            gama_i1: 5.0
           V_id: 0
                     duration_time_i: 4.0
                                                         demand_i: 160.0
                                                                                         work load_i: 160.0
                                                                                                                          work load gap_i: 0
116
           V id: 1
                                                    xi: 4.1
                                                                         bow of i: 0.1
                                                                                                     tail of i: 8.1
                                                                                                                               gama_i0: 0.0
                                li: 8.0
                                                                                                                                                            gama_i1: 1.0
                                                         demand_i: 120.0
                                                                                         work load_i: 120.0
                                                                                                                          work load gap_i: 0
                      duration_time_i: 1.0
117
118 Algorithm finished and the total CPU time: 117 s
119 End
120
```