```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=13610
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
     01_My_Python_Code', 'E:/1 \\ \text{0} \\ \
      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')
     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:
20
             trail = 4
21
             Pop\_size = 10
             Tolerance iteration unchanged number = 5
23
             Chrom\_size = 6
             Iter_num_GA = 300
24
25
             Select_rate = 0.9
26
             Crossover rate = 0.85
             Mutation rate = 0.95
27
28
             Mu_oper_type = 2
29
             vessel\_move\_way = 1
30
             coefficient for Obj1= 1.0
             coefficient for Obj2= 1.0
31
32
33
      Iteration begin:
34
35
      Beging the No. 0 iteration:
36
         obj[0] = 18.00
                                temp_best_value_gen = 18.00
37
         The No. 0 iteration is finished!
38
39
     Beging the No. 1 iteration:
40
         obj[gen-1] = 18.00 temp_best_value_gen = 18.00
41
         No, maintain solution and obj[gen] = 18.00, and the tolerance_counter = 1
42
         solution chromosome =
43
             first level: [ [2. 8.]
             second level: [6, 5,]
44
             third level: [4. 2.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 18.00 temp_best_value_gen = 16.03
49
50
         Yes, update solution and obj[gen] = 16.03
51
         solution chromosome =
52
             first level: [ [2.02 4.15]
53
             second level: [3. 1.]
54
             third level: [3. 3.]]
55
         The No. 2 iteration is finished!
56
57
      Beging the No. 3 iteration:
58
         obi[gen-1] = 16.03 temp best value gen = 16.03
59
         No, maintain solution and obj[gen] = 16.03, and the tolerance_counter = 1
60
         solution chromosome =
61
             first level: [ [2.02 4.15]
62
             second level: [3. 1.]
             third level: [3. 3.]]
63
         The No. 3 iteration is finished!
64
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 16.03 temp_best_value_gen = 16.03
68
         No, maintain solution and obj[gen] = 16.03, and the tolerance_counter = 2
69
         solution chromosome =
70
             first level: [ [2.02 4.15]
             second level: [3. 1.]
71
             third level: [3. 3.]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obi[gen-1] = 16.03 temp best value gen = 10.41
76
         Yes, update solution and obj[gen] = 10.41
77
         solution chromosome =
78
             first level: [ [2.17 4.16]
```

```
80
           second level: [1. 0.]
 81
          third level: [4. 8.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 10.41 temp_best_value_gen = 10.41
No, maintain solution and obj[gen] = 10.41, and the tolerance_counter = 1
 85
 86
 87
        solution chromosome =
 88
          first level: [[2.17 4.16]
 89
          second level: [1. 0.]
 90
          third level: [4. 8.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 10.41 temp_best_value_gen = 10.41
 95
        No, maintain solution and obj[gen] = 10.41, and the tolerance_counter = 2
 96
        solution chromosome =
 97
          first level: [ [2.17 4.16]
 98
          second level: [1. 0.]
 99
          third level: [4. 8.]]
100
        The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
        obj[gen-1] = 10.41 temp best value gen = 10.41
103
        No, maintain solution and obj[gen] = 10.41, and the tolerance_counter = 3
104
105
        solution chromosome =
106
          first level: [[2.17 4.16]
          second level: [1. 0.] third level: [4. 8.]]
107
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 10.41 temp_best_value_gen = 10.41
113
        No, maintain solution and obj[gen] = 10.41, and the tolerance_counter = 4
114
        solution chromosome =
115
          first level: [ [2.17 4.16]
116
          second level: [1. 0.]
          third level: [4. 8.]]
117
        The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 10.41 temp_best_value_gen = 10.41
121
        No, maintain solution and obj[gen] = 10.41, and the tolerance_counter = 5
122
123
        solution chromosome =
124
          first level: [ [2.17 4.16]
125
          second level: [1. 0.]
126
          third level: [4. 8.]]
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: [ [2.17 4.16]
133
134
          second level: [1. 0.]
135
          third level: [4. 8.]]
136
        Objective function values and some other indicators:
137
          Obj0 = 2.00
                                 Obj1 = 8.41
                                                        Obj0 + Obj1 = 10.41
138
          Total movement of crane: 7.41
139
          Total waiting time in berth position: 1.00
140
          Total index of q during berthing: 27.00
141
        Specific arrangement for each vessel:
                             li: 4.0
                                                                       bow of i: 0.2
                                                                                                                            gama i0: 1.0
142
          V_id: 0
                                                                                                   tail of i: 4.2
                                                                                                                                                        gama i1: 3.0
                    duration_time_i: 2.0
                                                        demand_i: 160.0
                                                                                      work load_i: 160.0
                                                                                                                        work load gap_i: 0
143
          V\_id{:}\ 1
                                                                       bow of i: 0.2
                              li: 8.0
                                                   xi: 4.2
                                                                                                   tail of i: 8.2
                                                                                                                            gama_i0: 0.0
                                                                                                                                                         gama_i1: 1.0
                     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: 84 s
146 End
147
```