```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=11028
 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')
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 = 32
20
21
            Pop\_size = 30
             Tolerance iteration unchanged number = 8
23
             Chrom\_size = 6
24
            Iter_num_GA = 300
25
             Select_rate = 0.85
26
             Crossover rate = 0.9
             Mutation rate = 0.9
27
28
             Mu_oper_type = 2
29
             vessel\_move\_way = 1
30
            coefficient for Obj1= 1.0
            coefficient for Obj2= 1.0
31
             gen = 0
32
33
     Iteration begin:
34
35
     Beging the No. 0 iteration:
         obj[0] = 12.14 temp_best_value_gen = 12.14
36
37
         The No. 0 iteration is finished!
38
39
     Beging the No. 1 iteration:
40
         obj[gen-1] = 12.14 temp_best_value_gen = 8.43
         Yes, update solution and obj[gen] = 8.43
41
         solution chromosome =
42
43
             first level: [ [2.2 4.08]
            second level: [1. 0.]
44
            third level: [3. 7.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 8.43 temp_best_value_gen = 8.43
49
50
         No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 1
51
         solution chromosome =
52
             first level: [ [2.2 4.08]
53
             second level: [1. 0.]
54
            third level: [3. 7.]]
55
         The No. 2 iteration is finished!
56
57
     Beging the No. 3 iteration:
58
         obi[gen-1] = 8.43 temp best value gen = 8.43
59
         No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 2
60
         solution chromosome =
61
             first level: [ [2.2 4.08]
62
             second level: [1. 0.]
            third level: [3. 7.]]
63
64
         The No. 3 iteration is finished!
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 8.43 temp_best_value_gen = 8.43
68
         No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 3
69
         solution chromosome =
70
            first level: [ [2.2 4.08]
             second level: [1. 0.]
71
            third level: [3. 7.]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obj[gen-1] = 8.43 temp_best_value_gen = 8.43
76
         No, maintain solution and obj[gen] = 8.43, and the tolerance counter = 4
77
78
         solution chromosome =
             first level: [ [2.2 4.08]
```

```
unknown
  80
           second level: [1. 0.]
  81
           third level: [3. 7.]]
  82
        The No. 5 iteration is finished!
  83
      Beging the No. 6 iteration:
  85
        obj[gen-1] = 8.43 temp best value gen = 8.43
        No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 5
  86
  87
        solution chromosome =
  88
           first level: [ [2.2 4.08]
  89
           second level: [1. 0.]
  90
           third level: [3. 7.]]
  91
        The No. 6 iteration is finished!
  92
  93 Beging the No. 7 iteration:
  94
        obj[gen-1] = 8.43 temp_best_value_gen = 8.43
  95
        No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 6
  96
        solution chromosome =
  97
           first level: [ [2.2 4.08]
  98
           second level: [1. 0.]
 99
           third level: [3. 7.]]
100
        The No. 7 iteration is finished!
101
102
      Beging the No. 8 iteration:
        obj[gen-1] = 8.43 temp best value gen = 8.43
103
        No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 7
104
105
        solution chromosome =
106
           first level: [ [2.2 4.08]
           second level: [1. 0.]
107
           third level: [3. 7.]]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 8.43 temp_best_value_gen = 8.43
113
        No, maintain solution and obj[gen] = 8.43, and the tolerance_counter = 8
        solution chromosome =
114
115
           first level: [ [2.2 4.08]
           second level: [1. 0.]
116
117
           third level: [3, 7.]]
118
        The No. 9 iteration is finished!
119
120
121
122
     The iteration is terminated and then visulize the solution:
123
        solution chromosome =
124
           first level: [ [2.2 4.08]
125
           second level: [1. 0.]
126
           third level: [3. 7.]]
127
        Objective function values and some other indicators:
           Obio = 3.00
                                Obj1 = 5.43
128
                                                       Obj0 + Obj1 = 8.43
129
           Total movement of crane: 4.43
130
           Total waiting time in berth position: 1.00
131
           Total index of q during berthing: 22.00
132
        Specific arrangement for each vessel:
                                                  xi: 2.2
                                                                                                 tail of i: 4.2
                                                                                                                          gama_i0: 1.0
133
           V_id: 0
                              li: 4.0
                                                                      bow of i: 0.2
                                                                                                                                                     gama_i1: 4.0
                     duration_time_i: 3.0
                                                       demand_i: 160.0
                                                                                     work load_i: 160.0
                                                                                                                     work load gap_i: 0
134
                                                                      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
                                                       demand i: 120.0
                                                                                     work load i: 120.0
                                                                                                                     work load gap i: 0
                     duration time i: 1.0
135
136 Algorithm finished and the total CPU time: 286 s
137 End
138
```