```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=12005
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.
   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 = 8
21
       Pop\_size = 10
       Tolerance iteration unchanged number = 5
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.95
       Mutation rate = 0.85
27
28
       Mu_oper_type = 2
29
       vessel_move_way = 2
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:
36
     obj[0] = 16.91 temp_best_value_gen = 16.91
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 16.91 temp_best_value_gen = 14.48
     Yes, update solution and obj[gen] = 14.48
41
     solution chromosome =
42
43
       first level: [ [2. 4.16]
       second level: [2. 0.]
44
       third level: [2. 7.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 14.48 temp_best_value_gen = 9.98
49
50
     Yes, update solution and obj[gen] = 9.98
51
     solution chromosome =
52
       first level: [ [2. 4.04]
53
       second level: [3. 0.]
54
       third level: [3. 6.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 9.98 temp best value gen = 9.98
59
     No, maintain solution and obj[gen] = 9.98, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [2. 4.04]
62
       second level: [3. 0.]
       third level: [3. 6.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 9.98 temp_best_value_gen = 9.98
68
     No, maintain solution and obj[gen] = 9.98, and the tolerance_counter = 2
69
     solution chromosome =
70
       first level: [ [2. 4.04]
       second level: [3. 0.]
71
       third level: [3. 6.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 9.98 temp best value gen = 7.39
76
     Yes, update solution and obj[gen] = 7.39
77
     solution chromosome =
78
       first level: [ [2.28 4.04]
```

```
80
           second level: [1. 0.]
 81
          third level: [3. 6.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 7.39 temp_best_value_gen = 7.39
No, maintain solution_and_obj[gen] = 7.39, and the tolerance_counter = 1
 85
 86
 87
        solution chromosome =
 88
          first level: [ [2.28 4.04]
 89
          second level: [1. 0.]
 90
          third level: [3. 6.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 7.39 temp_best_value_gen = 7.39
 95
        No, maintain solution and obj[gen] = 7.39, and the tolerance_counter = 2
 96
        solution chromosome =
 97
          first level: [ [2.28 4.04]
 98
          second level: [1. 0.]
 99
          third level: [3. 6.]]
100
        The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
        obj[gen-1] = 7.39 temp best value gen = 7.39
103
        No, maintain solution and obj[gen] = 7.39, and the tolerance_counter = 3
104
105
        solution chromosome =
106
          first level: [ [2.28 4.04]
107
          second level: [1. 0.]
          third level: [3. 6.]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 7.39 temp_best_value_gen = 7.39
113
        No, maintain solution and obj[gen] = 7.39, and the tolerance_counter = 4
114
        solution chromosome =
115
          first level: [ [2.28 4.04]
116
          second level: [1. 0.]
          third level: [3, 6,]]
117
        The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 7.39 temp_best_value_gen = 7.39
121
        No, maintain solution and obj[gen] = 7.39, and the tolerance_counter = 5
122
123
        solution chromosome =
124
          first level: [ [2.28 4.04]
125
          second level: [1. 0.]
126
          third level: [3. 6.]]
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: [ [2.28 4.04]
133
134
          second level: [1. 0.]
135
          third level: [3. 6.]]
136
        Objective function values and some other indicators:
137
          Obj0 = 3.00
                                Obj1 = 4.39
                                                       Obj0 + Obj1 = 7.39
138
          Total movement of crane: 3.39
139
          Total waiting time in berth position: 1.00
140
          Total index of q during berthing: 22.00
141
        Specific arrangement for each vessel:
                             li: 4.0
                                                                                                                           gama i0: 1.0
142
          V_id: 0
                                                                       bow of i: 0.3
                                                                                                  tail of i: 4.3
                                                                                                                                                       gama i1: 4.0
                    duration_time_i: 3.0
                                                       demand_i: 160.0
                                                                                      work load_i: 160.0
                                                                                                                       work load gap_i: 0
143
          V_id: 1
                                                                      bow of i: 0.0
                              li: 8.0
                                                  xi: 4.0
                                                                                                  tail of i: 8.0
                                                                                                                           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: 104 s
146 End
147
```