```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=25180
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 = 46
21
       Pop\_size = 10
       Tolerance iteration unchanged number = 6
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.75
       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:
     obj[0] = 11.05
                  temp_best_value_gen = 11.05
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 11.05 temp_best_value_gen = 11.05
41
     No, maintain solution and obj[gen] = 11.05, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [[3.1 6.01]
       second level: [4, 2,]
44
       third level: [4. 4.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 11.05 temp_best_value_gen = 11.05
49
50
     No, maintain solution and obj[gen] = 11.05, and the tolerance_counter = 2
51
     solution chromosome =
52
       first level: [[3.1 6.01]
53
       second level: [4. 2.]
54
       third level: [4. 4.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 11.05 temp best value gen = 7.35
     Yes, update solution and obj[gen] = 7.35
59
60
     solution chromosome =
61
       first level: [ [2.07 6.01]
62
       second level: [2. 0.]
       third level: [3. 4.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 7.35 temp_best_value_gen = 7.35
68
     No, maintain solution and obj[gen] = 7.35, and the tolerance_counter = 1
69
     solution chromosome =
70
       first level: [ [2.07 6.01]
       second level: [2. 0.]
71
       third level: [3. 4.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 7.35 temp best value gen = 7.35
76
     No, maintain solution and obj[gen] = 7.35, and the tolerance_counter = 2
77
     solution chromosome =
78
       first level: [ [2.07 6.01]
```

```
80
           second level: [2. 0.]
 81
          third level: [3. 4.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 7.35 temp_best_value_gen = 7.35
No, maintain solution_and_obj[gen] = 7.35, and the tolerance_counter = 3
 85
 86
 87
        solution chromosome =
 88
          first level: [ [2.07 6.01]
 89
          second level: [2. 0.]
 90
          third level: [3. 4.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 7.35 temp_best_value_gen = 7.35
 95
        No, maintain solution and obj[gen] = 7.35, and the tolerance_counter = 4
 96
        solution chromosome =
 97
          first level: [ [2.07 6.01]
 98
          second level: [2. 0.]
 99
          third level: [3. 4.]]
100
        The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
        obj[gen-1] = 7.35 temp best value gen = 7.35
103
        No, maintain solution and obj[gen] = 7.35, and the tolerance_counter = 5
104
105
        solution chromosome =
106
          first level: [ [2.07 6.01]
107
          second level: [2. 0.]
          third level: [3. 4.]]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 7.35 temp_best_value_gen = 7.35
113
        No, maintain solution and obj[gen] = 7.35, and the tolerance_counter = 6
        solution chromosome =
114
          first level: [ [2.07 6.01]
115
116
          second level: [2. 0.]
117
          third level: [3, 4,]]
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: [ [2.07 6.01]
125
          second level: [2. 0.]
126
          third level: [3. 4.]]
127
        Objective function values and some other indicators:
          Obio = 4.00
                                Obj1 = 2.69
128
                                                        Obj0 + Obj1 = 6.69
129
          Total movement of crane: 0.69
130
          Total waiting time in berth position: 2.00
131
          Total index of q during berthing: 26.00
        Specific arrangement for each vessel:
132
                                                                                                   tail of i: 4.1
                                                                                                                             gama_i0: 2.0
133
          V_id: 0
                              li: 4.0
                                                   xi: 2.1
                                                                       bow of i: 0.1
                                                                                                                                                        gama_i1: 5.0
                    duration_time_i: 3.0
                                                        demand_i: 160.0
                                                                                       work load_i: 160.0
                                                                                                                       work load gap_i: 0
134
                                                                       bow of i: 2.0
                                                                                                   tail of i: 10.0
                                                                                                                               gama i0: 0.0
          V id: 1
                              li: 8.0
                                                   xi: 6.0
                                                                                                                                                           gama i1: 2.0
                                                        demand i: 120.0
                                                                                      work load i: 120.0
                    duration time i: 2.0
                                                                                                                       work load gap_i: 0
135
136 Algorithm finished and the total CPU time: 90 s
137 End
138
```