```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=23235
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')
  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
     Parameter setting:
19
       trail = 2
20
21
       Pop\_size = 20
       Tolerance iteration unchanged number = 6
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.75
26
       Crossover rate = 0.75
27
       Mutation rate = 0.8
28
       Mu_oper_type = 1
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] = 9.00 temp_best_value_gen = 9.00
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 9.00 temp_best_value_gen = 9.00
41
     No, maintain solution and obj[gen] = 9.00, and the tolerance counter = 1
42
     solution chromosome =
43
       first level: [ [8. 4.]
       second level: [3, 0,]
44
       third level: [2. 2.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 9.00 temp_best_value_gen = 9.00
49
50
     No, maintain solution and obj[gen] = 9.00, and the tolerance_counter = 2
51
     solution chromosome =
52
       first level: [ [8. 4.]
       second level: [3. 0.]
53
54
       third level: [2. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 9.00 temp best value gen = 8.00
59
     Yes, update solution and obj[gen] = 8.00
60
     solution chromosome =
61
       first level: [ [8. 4.]
62
       second level: [0.3.]
       third level: [4. 2.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 8.00 temp_best_value_gen = 8.00
68
     No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 1
69
     solution chromosome =
70
       first level: [ [8. 4.]
       second level: [0. 3.]
71
       third level: [4. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 8.00 temp best value gen = 8.00
76
     No, maintain solution and obj[gen] = 8.00, and the tolerance counter = 2
77
     solution chromosome =
78
       first level: [[8. 4.]
```

```
80
          second level: [0. 3.]
 81
          third level: [4. 2.]]
 82
       The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 8.00 temp best value gen = 8.00
       No, maintain solution and obj[gen] = \overline{8.00}, and the tolerance_counter = 3
 86
 87
        solution chromosome =
 88
          first level: [ [8. 4.]
 89
          second level: [0. 3.]
 90
          third level: [4. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
       obj[gen-1] = 8.00 temp_best_value_gen = 8.00
 94
 95
       No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 4
 96
       solution chromosome =
 97
          first level: [ [8. 4.]
 98
          second level: [0.3.]
 99
          third level: [4. 2.]]
100
       The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
       obj[gen-1] = 8.00 temp best value gen = 8.00
103
       No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 5
104
105
       solution chromosome =
106
          first level: [ [8. 4.]
107
          second level: [0.3.]
          third level: [4. 2.]]
108
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
       obj[gen-1] = 8.00 temp_best_value_gen = 8.00
113
       No, maintain solution and obj[gen] = 8.00, and the tolerance_counter = 6
       solution chromosome =
114
115
          first level: [ [8. 4.]
116
          second level: [0.3.]
117
          third level: [4. 2.]]
       The No. 9 iteration is finished!
118
119
120
121
122
    The iteration is terminated and then visulize the solution:
123
       solution chromosome =
124
          first level: [[8. 4.]
125
          second level: [0.3.]
126
          third level: [4. 2.]]
127
        Objective function values and some other indicators:
128
          Obio = 5.00
                                Obi1 = 3.00
                                                       Obj0 + Obj1 = 8.00
129
          Total movement of crane: 0.00
130
          Total waiting time in berth position: 3.00
131
          Total index of q during berthing: 63.00
        Specific arrangement for each vessel:
132
                                                  xi: 8.0
                                                                                                 tail of i: 10.0
                                                                                                                            gama_i0: 0.0
133
          V_id: 0
                             li: 4.0
                                                                      bow of i: 6.0
                                                                                                                                                        gama_i1: 2.0
                    duration_time_i: 2.0
                                                       demand_i: 160.0
                                                                                     work load_i: 160.0
                                                                                                                     work load gap_i: 0
134
                                                                     bow of i: 0.0
                                                                                                 tail of i: 8.0
                                                                                                                          gama i0: 3.0
          V id: 1
                              li: 8.0
                                                  xi: 4.0
                                                                                                                                                     gama i1: 6.0
                                                       demand i: 120.0
                                                                                    work load i: 120.0
                                                                                                                     work load gap i: 0
                    duration time i: 3.0
135
136 Algorithm finished and the total CPU time: 155 s
137 End
138
```