```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=21117
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:
       trail = 47
20
21
       Pop\_size = 10
       Tolerance iteration unchanged number = 6
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.95
26
       Crossover rate = 0.75
       Mutation rate = 0.85
27
28
       Mu_oper_type = 2
29
       vessel\_move\_way = 1
30
       coefficient for Obj1= 0.5
       coefficient for Obj2= 1.5
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 = 6.65
     Yes, update solution and obj[gen] = 6.65
41
     solution chromosome =
42
43
       first level: [ [2.03 8. ]
       second level: [0, 2,]
44
       third level: [4. 5.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
49
     obj[gen-1] = 6.65 temp_best_value_gen = 6.65
50
     No, maintain solution and obj[gen] = 6.65, and the tolerance_counter = 1
51
     solution chromosome =
52
       first level: [ [2.03 8. ]
53
       second level: [0. 2.]
54
       third level: [4. 5.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 6.65 temp best value gen = 6.65
59
     No, maintain solution and obj[gen] = 6.65, and the tolerance_counter = 2
60
     solution chromosome =
61
       first level: [ [2.03 8. ]
62
       second level: [0. 2.]
       third level: [4. 5.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 6.65 temp_best_value_gen = 6.65
68
     No, maintain solution and obj[gen] = 6.65, and the tolerance_counter = 3
69
     solution chromosome =
70
       first level: [ [2.03 8. ]
71
       second level: [0. 2.]
       third level: [4. 5.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 6.65 temp_best_value_gen = 6.65
76
     No, maintain solution and obj[gen] = 6.65, and the tolerance counter = 4
77
78
     solution chromosome =
       first level: [ [2.03 8. ]
```

```
unknown
  80
           second level: [0. 2.]
 81
           third level: [4. 5.]]
  82
        The No. 5 iteration is finished!
 83
      Beging the No. 6 iteration:
        obj[gen-1] = 6.65 temp best value gen = 6.65
  85
  86
        No, maintain solution and obj[gen] = 6.65, and the tolerance_counter = 5
  87
        solution chromosome =
  88
           first level: [ [2.03 8. ]
           second level: [0, 2,]
  89
  90
           third level: [4. 5.]]
 91
        The No. 6 iteration is finished!
  92
  93 Beging the No. 7 iteration:
  94
        obj[gen-1] = 6.65 temp_best_value_gen = 6.65
  95
        No, maintain solution and obj[gen] = 6.65, and the tolerance_counter = 6
  96
        solution chromosome =
 97
           first level: [ [2.03 8. ]
 98
           second level: [0. 2.]
           third level: [4. 5.]]
 99
100
        The No. 7 iteration is finished!
101
102
103
104 The iteration is terminated and then visulize the solution:
105
        solution chromosome =
106
           first level: [[2.03 8.]]
           second level: [0. 2.] third level: [4. 5.]
107
108
109
        Objective function values and some other indicators:
110
           0bi0 = 3.00
                                Obj1 = 3.43
                                                       Obj0 + Obj1 = 6.43
           Total movement of crane: 1.43
111
112
           Total waiting time in berth position: 2.00
113
           Total index of q during berthing: 46.00
114
        Specific arrangement for each vessel:
                                                                                                                           gama_i0: 0.0
115
                               li: 4.0
                                                   xi: 2.0
                                                                       bow of i: 0.0
                                                                                                  tail of i: 4.0
                                                                                                                                                       gama_i1: 2.0
           V_id: 0
                     duration_time_i: 2.0
                                                        demand_i: 160.0
                                                                                      work load_i: 160.0
                                                                                                                      work load gap_i: 0
116
           V id: 1
                                                   xi: 8.0
                                                                      bow of i: 4.0
                                                                                                  tail of i: 12.0
                                                                                                                              gama_i0: 2.0
                               li: 8.0
                                                                                                                                                         gama_i1: 4.0
                                                        demand_i: 120.0
                                                                                      work load_i: 120.0
                     duration\_time\_i{:}~2.0
                                                                                                                      work load gap_i: 0
117
118 Algorithm finished and the total CPU time: 68 s
119 End
120
```