```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=38670
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 = 44
20
21
       Pop\_size = 30
       Tolerance iteration unchanged number = 5
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.75
       Mutation rate = 0.9
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] = 7.13 temp_best_value_gen = 7.13
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 7.13 temp_best_value_gen = 6.23
     Yes, update solution and obj[gen] = 6.23
41
     solution chromosome =
42
43
       first level: [ [2.01 4. ]
       second level: [0, 3,]
44
       third level: [4. 6.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
49
     obj[gen-1] = 6.23 temp_best_value_gen = 6.23
50
     No, maintain solution and obj[gen] = 6.23, and the tolerance_counter = 1
51
     solution chromosome =
52
       first level: [ [2.01 4. ]
53
       second level: [0.3.]
54
       third level: [4. 6.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obj[gen-1] = 6.23 temp best value gen = 6.23
59
     No, maintain solution and obj[gen] = 6.23, and the tolerance_counter = 2
60
     solution chromosome =
61
       first level: [ [2.01 4. ]
62
       second level: [0.3.]
       third level: [4. 6.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 6.23 temp_best_value_gen = 6.23
68
     No, maintain solution and obj[gen] = 6.23, and the tolerance_counter = 3
69
     solution chromosome =
70
       first level: [ [2.01 4. ]
71
       second level: [0.3.]
       third level: [4. 6.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 6.23 temp_best_value_gen = 6.23
76
     No, maintain solution and obj[gen] = 6.23, and the tolerance_counter = 4
77
78
     solution chromosome =
       first level: [ [2.01 4. ]
```

```
80
           second level: [0, 3,]
 81
          third level: [4. 6.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 6.23 temp_best_value_gen = 6.23
No, maintain solution and obj[gen] = 6.23, and the tolerance_counter = 5
 85
 86
 87
        solution\ chromosome =
 88
          first level: [ [2.01 4. ]
 89
          second level: [0, 3.]
 90
          third level: [4. 6.]]
 91
        The No. 6 iteration is finished!
 92
 93
 94
 95
    The iteration is terminated and then visulize the solution:
       solution chromosome =
 96
 97
          first level: [ [2.01 4. ]
 98
          second level: [0.3.]
 99
          third level: [4. 6.]
        Objective function values and some other indicators:
100
101
          Obj0 = 3.00
                                                        Obj0 + Obj1 = 6.46
                                 Obj1 = 3.46
           Total movement of crane: 0.46
102
103
          Total waiting time in berth position: 3.00
104
          Total index of q during berthing: 27.00
105
        Specific arrangement for each vessel:
106
          V_id: 0
                              li: 4.0
                                                   xi: 2.0
                                                                        bow of i: 0.0
                                                                                                   tail of i: 4.0
                                                                                                                             gama i0: 0.0
                                                                                                                                                         gama_i1: 2.0
                     duration_time_i: 2.0
                                                        demand_i: 160.0
                                                                                       work load_i: 160.0
                                                                                                                        work load gap_i: 0
107
                              li: 8.0
                                                                       bow of i: 0.0
                                                                                                   tail of i: 8.0
           V_id: 1
                                                   xi: 4.0
                                                                                                                             gama_i0: 3.0
                                                                                                                                                         gama_i1: 4.0
                                                        demand_i: 120.0
                     duration_time_i: 1.0
                                                                                       work load_i: 120.0
                                                                                                                        work load gap_i: 0
109 Algorithm finished and the total CPU time: 170 s
110 End
111
```