```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=24930
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.
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 = 45
20
       Pop\_size = 20
21
       Tolerance iteration unchanged number = 5
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.9
27
       Mutation rate = 0.75
28
       Mu_oper_type = 1
29
       vessel\_move\_way = 1
30
       coefficient for Obj1= 1.5
       coefficient for Obj2= 0.5
31
32
       gen = 0
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
     obj[0] = 7.00 temp_best_value_gen = 7.00
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 7.00 temp_best_value_gen = 7.00
41
     No, maintain solution and obj[gen] = 7.00, and the tolerance counter = 1
42
     solution chromosome =
43
       first level: [ [2. 8.]
       second level: [2, 3,]
44
       third level: [4. 8.]]
45
     The No. 1 iteration is finished!
46
47
   Beging the No. 2 iteration:
obj[gen-1] = 7.00 temp_best_value_gen = 6.00
48
49
50
     Yes, update solution and obj[gen] = 6.00
51
     solution chromosome =
52
       first level: [ [2. 8.]
       second level: [0.3.]
53
54
       third level: [4. 8.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 6.00 temp best value gen = 6.00
59
     No, maintain solution and obj[gen] = 6.00, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [2. 8.]
62
       second level: [0.3.]
       third level: [4. 8.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 6.00 temp_best_value_gen = 3.00
68
     Yes, update solution and obj[gen] = 3.00
69
     solution chromosome =
70
       first level: [ [2. 8.]
71
       second level: [0. 0.]
       third level: [4. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 3.00 temp best value gen = 3.00
76
     No, maintain solution and obj[gen] = 3.00, and the tolerance counter = 1
77
     solution chromosome =
78
       first level: [ [2. 8.]
```

```
80
           second level: [0. 0.]
 81
          third level: [4. 2.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 3.00 temp_best_value_gen = 3.00
No, maintain solution_and_obj[gen] = 3.00, and the tolerance_counter = 2
 85
 86
 87
        solution chromosome =
 88
          first level: [ [2. 8.]
 89
          second level: [0. 0.]
 90
          third level: [4. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 3.00 temp_best_value_gen = 3.00
 95
        No, maintain solution and obj[gen] = 3.00, and the tolerance_counter = 3
 96
        solution chromosome =
 97
          first level: [ [2. 8.]
 98
          second level: [0. 0.]
 99
          third level: [4. 2.]]
100
        The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
        obj[gen-1] = 3.00 temp best value gen = 3.00
103
        No, maintain solution and obj[gen] = 3.00, and the tolerance_counter = 4
104
105
        solution chromosome =
106
          first level: [ [2. 8.]
107
          second level: [0. 0.]
          third level: [4. 2.]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 3.00 temp_best_value_gen = 3.00
113
        No, maintain solution and obj[gen] = 3.00, and the tolerance_counter = 5
        solution chromosome =
114
115
          first level: [ [2. 8.]
116
          second level: [0. 0.]
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: [ [2. 8.]
125
          second level: [0. 0.]
126
          third level: [4. 2.]]
127
        Objective function values and some other indicators:
128
          Obio = 2.00
                                 Obj1 = 0.00
                                                        Obj0 + Obj1 = 2.00
129
          Total movement of crane: 0.00
          Total waiting time in berth position: 0.00
130
131
          Total index of q during berthing: 39.00
        Specific arrangement for each vessel:
132
                                                   xi: 2.0
                                                                                                   tail of i: 4.0
                                                                                                                             gama_i0: 0.0
133
          V_id: 0
                              li: 4.0
                                                                       bow of i: 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
134
                                                                       bow of i: 4.0
                                                                                                   tail of i: 12.0
                                                                                                                               gama i0: 0.0
          V id: 1
                              li: 8.0
                                                   xi: 8.0
                                                                                                                                                           gama i1: 3.0
                                                        demand i: 120.0
                                                                                      work load i: 120.0
                    duration time i: 3.0
                                                                                                                       work load gap_i: 0
135
136 Algorithm finished and the total CPU time: 159 s
137 End
138
```