```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=36292
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 = 13
20
21
       Pop\_size = 20
       Tolerance iteration unchanged number = 5
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.75
26
       Crossover rate = 0.8
       Mutation rate = 0.9
27
28
       Mu_oper_type = 2
29
       vessel_move_way = 2
30
       coefficient for Obj1= 0.5
       coefficient for Obj2= 1.5
31
32
       gen = 0
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
     obj[0] = 13.20 temp_best_value_gen = 13.20
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 13.20 temp_best_value_gen = 10.79
     Yes, update solution and obj[gen] = 10.79
41
     solution chromosome =
42
43
       first level: [ [2.49 4.04]
       second level: [1. 0.]
44
       third level: [4. 7.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 10.79 temp_best_value_gen = 10.79
49
50
     No, maintain solution and obj[gen] = 10.79, and the tolerance_counter = 1
51
     solution chromosome =
52
       first level: [ [2.49 4.04]
53
       second level: [1. 0.]
54
       third level: [4. 7.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 10.79 temp best value gen = 10.43
     Yes, update solution and obj[gen] = 10.43
59
60
     solution chromosome =
61
       first level: [ [2.49 4.04]
62
       second level: [1. 0.]
       third level: [4. 6.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 10.43 temp_best_value_gen = 7.77
68
     Yes, update solution and obj[gen] = 7.77
     solution chromosome =
69
70
       first level: [ [2.05 4.08]
       second level: [1. 0.]
71
       third level: [4. 8.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 7.77 temp best value gen = 7.45
76
     Yes, update solution and obj[gen] = 7.45
77
     solution chromosome =
78
       first level: [ [2.02 4.01]
```

```
80
           second level: [0, 3,]
 81
          third level: [3. 6.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 7.45 temp_best_value_gen = 7.45
No, maintain solution_and_obj[gen] = 7.45, and the tolerance_counter = 1
 85
 86
 87
        solution chromosome =
 88
          first level: [ [2.02 4.01]
 89
          second level: [0. 3.]
 90
          third level: [3. 6.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 7.45 temp_best_value_gen = 3.56
 94
 95
        Yes, update solution and obj[gen] = 3.56
 96
       solution chromosome =
 97
          first level: [ [2.01 4. ]
 98
          second level: [1. 0.]
 99
          third level: [2. 7.]]
       The No. 7 iteration is finished!
100
101
102
     Beging the No. 8 iteration:
       obj[gen-1] = 3.56 temp best value gen = 3.56
103
104
       No, maintain solution and obj[gen] = 3.56, and the tolerance_counter = 1
105
        solution chromosome =
          first level: [[2.01 4.]]
106
          second level: [1. 0.]
107
          third level: [2. 7.]]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 3.56 temp_best_value_gen = 3.56
113
        No, maintain solution and obj[gen] = 3.56, and the tolerance_counter = 2
114
       solution chromosome =
115
          first level: [ [2.01 4. ]
116
          second level: [1. 0.]
          third level: [2, 7.]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 3.56 temp best value gen = 3.56
       No, maintain solution and obj[\overline{gen}] = \overline{3.56}, and the tolerance_counter = 3
122
123
        solution chromosome =
124
          first level: [ [2.01 4. ]
125
          second level: [1. 0.]
126
          third level: [2. 7.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
        obj[gen-1] = 3.56 temp_best_value_gen = 3.56
131
       No, maintain solution and obj[gen] = 3.56, and the tolerance_counter = 4
132
       solution chromosome =
          first level: [ [2.01 4. ]
133
134
          second level: [1. 0.]
135
          third level: [2. 7.]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 3.56 temp_best_value_gen = 3.56
140
       No, maintain solution and obj[gen] = 3.56, and the tolerance_counter = 5
141
        solution chromosome =
142
          first level: [[2.01 4.]]
          second level: [1. 0.]
143
          third level: [2. 7.]]
144
145
        The No. 12 iteration is finished!
146
147
148
149 The iteration is terminated and then visulize the solution:
       solution chromosome =
150
151
          first level: [ [2.01 4. ]
          second level: [1. 0.] third level: [2. 7.]]
152
153
154
        Objective function values and some other indicators:
155
                                 Obj1 = 1.04
          Obi0 = 4.00
                                                        Obj0 + Obj1 = 5.04
156
          Total movement of crane: 0.04
157
          Total waiting time in berth position: 1.00
158
          Total index of q during berthing: 19.00
159
        Specific arrangement for each vessel:
160
                              li: 4.0
           V id: 0
                                                   xi: 2.0
                                                                       bow of i: 0.0
                                                                                                    tail of i: 4.0
                                                                                                                             gama i0: 1.0
                                                                                                                                                         gama i1: 5.0
                    duration_time_i: 4.0
                                                        demand_i: 160.0
                                                                                       work load i: 160.0
                                                                                                                        work load gap_i: 0
                                                                       bow of i: 0.0
161
          V_id: 1
                                                                                                    tail of i: 8.0
                              li: 8.0
                                                   xi: 4.0
                                                                                                                             gama_i0: 0.0
                                                                                                                                                          gama_i1: 1.0
                    duration_time_i: 1.0
                                                        demand i: 120.0
                                                                                       work load_i: 120.0
                                                                                                                        work load gap_i: 0
```

unknown

162 163 164 163	2 3 Algorithm finished and the total CPU time: 212 s 4 End 5