```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=4426
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 = 42
20
21
       Pop\_size = 30
       Tolerance iteration unchanged number = 6
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.75
26
       Crossover rate = 0.95
       Mutation rate = 0.95
27
28
       Mu_oper_type = 1
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] = 11.50 temp_best_value_gen = 11.50
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 11.50 temp_best_value_gen = 10.50
     Yes, update solution and obj[gen] = 10.50
41
     solution chromosome =
42
43
       first level: [ [8. 4.]
       second level: [2, 4,]
44
       third level: [4. 4.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 10.50 temp_best_value_gen = 10.50
49
50
     No, maintain solution and obj[gen] = 10.50, and the tolerance_counter = 1
51
     solution chromosome =
52
       first level: [ [8. 4.]
       second level: [2. 4.]
53
54
       third level: [4. 4.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 10.50 temp best value gen = 10.50
59
     No, maintain solution and obj[gen] = 10.50, and the tolerance_counter = 2
60
     solution chromosome =
61
       first level: [ [8. 4.]
62
       second level: [2.4.]
       third level: [4. 4.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 10.50 temp_best_value_gen = 8.00
68
     Yes, update solution and obj[gen] = 8.00
69
     solution chromosome =
70
       first level: [ [2. 8.]
       second level: [1.3.]
71
       third level: [2. 4.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 8.00 temp best value gen = 6.50
76
     Yes, update solution and obj[gen] = 6.50
77
     solution chromosome =
78
       first level: [ [2. 8.]
```

```
80
          second level: [1, 0,]
 81
          third level: [2, 4,]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 6.50 temp best value gen = 6.50
       No, maintain solution and obj[gen] = \overline{6.50}, and the tolerance_counter = 1
 86
 87
        solution chromosome =
 88
          first level: [ [2. 8.]
 89
          second level: [1. 0.]
 90
          third level: [2. 4.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
       obj[gen-1] = 6.50 temp_best_value_gen = 6.50
 95
       No, maintain solution and obj[gen] = 6.50, and the tolerance_counter = 2
 96
       solution chromosome =
 97
          first level: [ [2. 8.]
 98
          second level: [1. 0.]
 99
          third level: [2, 4,]]
       The No. 7 iteration is finished!
100
101
102
     Beging the No. 8 iteration:
103
       obj[gen-1] = 6.50 temp best value gen = 6.50
104
       No, maintain solution and obj[gen] = 6.50, and the tolerance_counter = 3
105
        solution chromosome =
          first level: [ [2. 8.]
106
107
          second level: [1. 0.]
108
          third level: [2. 4.]]
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 6.50 temp_best_value_gen = 6.50
113
        No, maintain solution and obj[gen] = 6.50, and the tolerance_counter = 4
114
       solution chromosome =
115
          first level: [ [2. 8.]
116
          second level: [1. 0.]
          third level: [2, 4,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 6.50 temp best value gen = 6.50
       No, maintain solution and obj[\overline{gen}] = \overline{6.50}, and the tolerance_counter = 5
122
123
        solution chromosome =
124
          first level: [ [2. 8.]
125
          second level: [1. 0.]
126
          third level: [2. 4.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
        obj[gen-1] = 6.50 temp_best_value_gen = 6.50
131
       No, maintain solution and obj[gen] = 6.50, and the tolerance_counter = 6
132
       solution chromosome =
133
          first level: [ [2. 8.]
134
          second level: [1. 0.]
135
          third level: [2, 4,]]
136
       The No. 11 iteration is finished!
137
138
139
140 The iteration is terminated and then visulize the solution:
141
       solution chromosome =
142
          first level: [ [2. 8.]
          second level: [1. 0.]
143
          third level: [2. 4.]]
144
145
        Objective function values and some other indicators:
                                                       Obj0 + Obj1 = 5.00
146
          Obj0 = 4.00
                                Obj1 = 1.00
          Total movement of crane: 0.00
147
148
          Total waiting time in berth position: 1.00
149
          Total index of q during berthing: 35.00
150
        Specific arrangement for each vessel:
151
          V_id: 0
                              li: 4.0
                                                  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
152
                                                                      bow of i: 4.0
          V id: 1
                              li: 8.0
                                                                                                  tail of i: 12.0
                                                                                                                             gama i0: 0.0
                                                                                                                                                         gama i1: 2.0
                    duration_time_i: 2.0
                                                       demand_i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                      work load gap_i: 0
153
154 Algorithm finished and the total CPU time: 271 s
155 End
156
```