```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=5187
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:
20
       trail = 43
21
       Pop\_size = 10
       Tolerance iteration unchanged number = 6
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.95
27
       Mutation rate = 0.8
28
       Mu_oper_type = 2
29
       vessel\_move\_way = 2
30
       coefficient for Obj1= 1.9
       coefficient for Obj2= 0.100000000000000009
31
32
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
     obj[0] = 8.57 temp_best_value_gen = 8.57
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 8.57 temp_best_value_gen = 8.57
41
     No, maintain solution and obj[gen] = 8.57, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [2.28 4.6 ]
       second level: [1. 0.]
44
       third level: [3. 8.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 8.57 temp_best_value_gen = 8.57
49
50
     No, maintain solution and obj[gen] = 8.57, and the tolerance_counter = 2
51
     solution chromosome =
52
       first level: [ [2.28 4.6 ]
53
       second level: [1. 0.]
54
       third level: [3. 8.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obj[gen-1] = 8.57 temp best value gen = 5.62
59
     Yes, update solution and obj[gen] = 5.62
60
     solution chromosome =
61
       first level: [[2. 4.35]
62
       second level: [0. 2.]
       third level: [4. 7.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 5.62 temp_best_value_gen = 5.62
68
     No, maintain solution and obj[gen] = 5.62, and the tolerance_counter = 1
69
     solution chromosome =
       first level: [ [2. 4.35] second level: [0. 2.]
70
71
       third level: [4. 7.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 5.62 temp_best_value_gen = 4.83
76
     Yes, update solution and obj[gen] = 4.83
77
78
     solution chromosome =
       first level: [ [2. 4.18]
```

```
80
          second level: [0, 2,]
 81
          third level: [4. 6.]]
 82
       The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 4.83 temp best value gen = 4.83
       No, maintain solution and obj[gen] = 4.83, and the tolerance_counter = 1
 86
 87
       solution chromosome =
 88
          first level: [ [2. 4.18]
          second level: [0, 2.]
 89
 90
          third level: [4. 6.]]
 91
       The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
       obj[gen-1] = 4.83 temp_best_value_gen = 4.83
 95
       No, maintain solution and obj[gen] = 4.83, and the tolerance_counter = 2
 96
       solution chromosome =
 97
          first level: [ [2. 4.18]
          second level: [0. 2.]
 98
 99
          third level: [4. 6.]]
       The No. 7 iteration is finished!
100
101
102
     Beging the No. 8 iteration:
103
       obj[gen-1] = 4.83 temp best value gen = 4.83
104
       No, maintain solution and obj[gen] = 4.83, and the tolerance_counter = 3
105
       solution chromosome =
          first level: [[2. 4.18]
106
107
          second level: [0. 2.]
108
          third level: [4. 6.]]
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
       obj[gen-1] = 4.83 temp_best_value_gen = 4.83
113
       No, maintain solution and obj[gen] = 4.83, and the tolerance_counter = 4
114
       solution chromosome =
115
          first level: [ [2. 4.18]
          second level: [0. 2.]
116
          third level: [4, 6,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 4.83 temp_best_value_gen = 4.83
       No, maintain solution and obj[gen] = 4.83, and the tolerance_counter = 5
122
123
       solution chromosome =
124
          first level: [ [2. 4.18]
125
          second level: [0. 2.]
126
          third level: [4. 6.]]
127
       The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
       obj[gen-1] = 4.83 temp_best_value_gen = 4.83
131
       No, maintain solution and obj[gen] = 4.83, and the tolerance_counter = 6
132
       solution chromosome =
          first level: [ [2. 4.18]
133
134
          second level: [0. 2.]
135
          third level: [4. 6.]]
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. 4.18]
143
          second level: [0. 2.]
          third level: [4. 6.]]
144
145
       Objective function values and some other indicators:
                                                      Obj0 + Obj1 = 12.33
146
          Obj0 = 2.00
                                Obj1 = 10.33
147
          Total movement of crane: 8.33
148
          Total waiting time in berth position: 2.00
149
          Total index of q during berthing: 27.00
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: 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
                                                                     bow of i: 0.2
152
          V id: 1
                             li: 8.0
                                                                                                tail of i: 8.2
                                                                                                                         gama i0: 2.0
                                                                                                                                                    gama i1: 3.0
                    duration_time_i: 1.0
                                                                                    work load_i: 120.0
                                                      demand_i: 120.0
                                                                                                                    work load gap_i: 0
153
154 Algorithm finished and the total CPU time: 93 s
155 End
156
```