```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=3725
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
     01_My_Python_Code', 'E:/1 \\ \text{0} \\ \
     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_5 _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 = 58
21
            Pop\_size = 30
             Tolerance iteration unchanged number = 10
23
             Chrom\_size = 6
            Iter_num_GA = 300
24
25
             Select_rate = 0.85
26
             Crossover rate = 0.95
             Mutation rate = 0.95
27
28
             Mu_oper_type = 1
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] = 3.06 temp_best_value_gen = 3.06
36
37
         The No. 0 iteration is finished!
38
39
     Beging the No. 1 iteration:
40
         obj[gen-1] = 3.06 temp_best_value_gen = 3.06
41
         No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 1
42
         solution chromosome =
43
             first level: [ [4.3 5.73]
            second level: [1. 0.]
44
            third level: [5. 3.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 3.06 temp_best_value_gen = 3.06
49
50
         No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 2
51
         solution chromosome =
52
             first level: [ [4.3 5.73]
53
             second level: [1. 0.]
54
            third level: [5. 3.]]
55
         The No. 2 iteration is finished!
56
57
     Beging the No. 3 iteration:
58
         obj[gen-1] = 3.06 temp best value gen = 3.06
59
         No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 3
60
         solution chromosome =
61
             first level: [ [4.3 5.73]
62
             second level: [1. 0.]
            third level: [5. 3.]]
63
         The No. 3 iteration is finished!
64
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 3.06 temp_best_value_gen = 3.06
68
         No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 4
69
         solution chromosome =
70
            first level: [ [4.3 5.73]
             second level: [1. 0.]
71
            third level: [5. 3.]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obj[gen-1] = 3.06 temp best value gen = 3.06
76
         No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 5
77
78
         solution chromosome =
             first level: [ [4.3 5.73]
```

```
80
          second level: [1, 0,]
 81
         third level: [5. 3.]]
 82
       The No. 5 iteration is finished!
 83
 84 Beging the No. 6 iteration:
 main BACASP_official_ENSGA-II.py:272: RuntimeWarning: divide by zero encountered in scalar divide
      fitness_2dim_col[chrom_i, 0] = 1 / sol_Obj[0]
       obj[gen-1] = 3.06 temp_best_value_gen = 3.06
       No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 6
 88
 29
       solution chromosome =
 90
          first level: [ [4.3 5.73]
 91
         second level: [1. 0.]
 92
         third level: [5. 3.]]
 93
       The No. 6 iteration is finished!
 94
    Beging the No. 7 iteration:
obj[gen-1] = 3.06 temp_best_value_gen = 3.06
 95
96
 97
       No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 7
 98
       solution chromosome =
         first level: [ [4.3 5.73]
 99
100
         second level: [1. 0.]
101
         third level: [5. 3.]]
102
       The No. 7 iteration is finished!
103
104 Beging the No. 8 iteration:
       obj[gen-1] = 3.06 temp best value gen = 3.06
105
106
       No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 8
       solution chromosome =
107
108
          first level: [ [4.3 5.73]
         second level: [1. 0.] third level: [5. 3.]
109
110
111
       The No. 8 iteration is finished!
112
113 Beging the No. 9 iteration:
       obj[gen-1] = 3.06 temp_best_value_gen = 3.06
114
115
       No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 9
       solution chromosome =
116
         first level: [ [4.3 5.73]
117
         second level: [1. 0.]
118
119
         third level: [5. 3.]]
120
       The No. 9 iteration is finished!
121
122 Beging the No. 10 iteration:
123
       obj[gen-1] = 3.06 temp_best_value_gen = 3.06
124
       No, maintain solution and obj[gen] = 3.06, and the tolerance_counter = 10
125
       solution chromosome =
126
         first level: [ [4.3 5.73]
         second level: [1. 0.]
127
         third level: [5. 3.]]
128
       The No. 10 iteration is finished!
129
130
131
132
133 The iteration is terminated and then visulize the solution:
134
       solution chromosome =
135
         first level: [ [4.3 5.73]
          second level: [1. 0.]
136
137
         third level: [5. 3.]]
       Objective function values and some other indicators:
138
139
         Obi0 = 1.00
                                                    Obj0 + Obj1 = 12.59
                              Obj1 = 11.59
          Total movement of crane: 10.59
140
141
         Total waiting time in berth position: 1.00
         Total index of q during berthing: 22.00
142
       Specific arrangement for each vessel:
143
144
          V_id: 0
                            li: 6.0
                                               xi: 4.3
                                                                  bow of i: 1.3
                                                                                            tail of i: 7.3
                                                                                                                    gama_i0: 1.0
                                                                                                                                              gama_i1: 2.0
                   duration time i: 1.0
                                                    demand i: 80.0
                                                                                 work load i: 80.0
                                                                                                               work load gap_i: 0
                                                                  bow of i: 3.2
                                                                                            tail of i: 8.2
145
          V_id: 1
                            li: 5.0
                                                                                                                    gama i0: 0.0
                                                                                                                                              gama_i1: 1.0
                                                    demand i: 60.0
                                                                                work load i: 60.0
                                                                                                               work load gap_i: 0
                   duration time i: 1.0
147 Algorithm finished and the total CPU time: 290 s
148 End
149
```