```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=5274
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 = 44
20
21
       Pop\_size = 30
       Tolerance iteration unchanged number = 5
23
       Chrom size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.75
       Mutation rate = 0.9
27
28
       Mu_oper_type = 2
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] = 8.27 temp_best_value_gen = 8.27
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 8.27 temp_best_value_gen = 8.27
41
     No, maintain solution and obj[gen] = 8.27, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [2.09 4.02]
       second level: [3. 0.]
44
       third level: [4. 8.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 8.27 temp_best_value_gen = 6.43
49
50
     Yes, update solution and obj[gen] = 6.43
51
     solution chromosome =
52
       first level: [ [2.24 4.1 ]
53
       second level: [1. 0.]
54
       third level: [4. 6.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 6.43 temp best value gen = 6.43
59
     No, maintain solution and obj[gen] = 6.43, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [2.24 4.1 ]
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] = 6.43 temp_best_value_gen = 6.43
68
     No, maintain solution and obj[gen] = 6.43, and the tolerance_counter = 2
69
     solution chromosome =
70
       first level: [ [2.24 4.1 ]
       second level: [1. 0.]
71
       third level: [4. 6.]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 6.43 temp_best_value_gen = 6.43
76
     No, maintain solution and obj[gen] = 6.43, and the tolerance_counter = 3
77
78
     solution chromosome =
       first level: [ [2.24 4.1 ]
```

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80
          second level: [1, 0,]
 81
          third level: [4. 6.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 6.43 temp best value gen = 6.43
       No, maintain solution and obj[gen] = 6.43, and the tolerance_counter = 4
 86
 87
        solution chromosome =
 88
          first level: [ [2.24 4.1 ]
 89
          second level: [1, 0.]
 90
          third level: [4. 6.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 6.43 temp_best_value_gen = 5.16
 95
        Yes, update solution and obj[gen] = 5.16
 96
       solution chromosome =
 97
          first level: [ [2.05 4.05]
 98
          second level: [0. 2.]
 99
          third level: [4. 7.]]
       The No. 7 iteration is finished!
100
101
102
     Beging the No. 8 iteration:
       obj[gen-1] = 5.16 temp best value gen = 5.16
103
104
       No, maintain solution and obj[gen] = 5.16, and the tolerance_counter = 1
105
        solution chromosome =
          first level: [ [2.05 4.05]
106
          second level: [0. 2.]
107
          third level: [4. 7.]]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 5.16 temp_best_value_gen = 5.16
113
        No, maintain solution and obj[gen] = 5.16, and the tolerance_counter = 2
114
       solution chromosome =
          first level: [ [2.05 4.05]
115
116
          second level: [0. 2.]
          third level: [4, 7,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 5.16 temp_best_value_gen = 5.16
       No, maintain solution and obj[\overline{gen}] = \overline{5.16}, and the tolerance_counter = 3
122
123
        solution chromosome =
124
          first level: [ [2.05 4.05]
125
          second level: [0. 2.]
126
          third level: [4. 7.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
        obj[gen-1] = 5.16 temp_best_value_gen = 5.16
131
       No, maintain solution and obj[gen] = 5.16, and the tolerance_counter = 4
132
       solution chromosome =
          first level: [ [2.05 4.05]
133
134
          second level: [0. 2.]
135
          third level: [4. 7.]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 5.16 temp_best_value_gen = 5.16
140
       No, maintain solution and obj[gen] = 5.16, and the tolerance_counter = 5
141
        solution chromosome =
142
          first level: [ [2.05 4.05]
          second level: [0. 2.]
143
          third level: [4. 7.]]
144
145
        The No. 12 iteration is finished!
146
147
148
149 The iteration is terminated and then visulize the solution:
150
       solution chromosome =
          first level: [ [2.05 4.05]
151
152
          second level: [0, 2.]
153
          third level: [4. 7.]]
154
        Objective function values and some other indicators:
155
                                Obj1 = 4.33
          Obj0 = 2.00
                                                       Obj0 + Obj1 = 6.33
156
          Total movement of crane: 2.33
157
          Total waiting time in berth position: 2.00
158
          Total index of q during berthing: 27.00
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: 0.0
                                                                                                                                                      gama i1: 2.0
                                                                                     work load i: 160.0
                    duration time i: 2.0
                                                       demand_i: 160.0
                                                                                                                      work load gap_i: 0
                                                                      bow of i: 0.1
161
          V_id: 1
                                                                                                 tail of i: 8.1
                              li: 8.0
                                                  xi: 4.1
                                                                                                                           gama_i0: 2.0
                                                                                                                                                      gama_i1: 3.0
                    duration_time_i: 1.0
                                                       demand i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                     work load gap_i: 0
```

## unknown

163 Algorithm finished and the total CPU time: 314 s 164 End 165	