```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=53614
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 = 58
21
       Pop\_size = 30
       Tolerance iteration unchanged number = 10
23
       Chrom size = 6
24
       Iter_num_GA = 300
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] = 8.38 temp_best_value_gen = 8.38
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 8.38 temp_best_value_gen = 8.28
     Yes, update solution and obj[gen] = 8.28
41
     solution chromosome =
42
43
       first level: [ [7.05 4.06]
       second level: [3, 1,]
44
       third level: [4. 3.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 8.28 temp_best_value_gen = 4.00
49
50
     Yes, update solution and obj[gen] = 4.00
51
     solution chromosome =
       first level: [ [2. 8.]
52
       second level: [1. 1.]
53
54
       third level: [4. 4.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 4.00 temp best value gen = 4.00
59
     No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [2. 8.]
62
       second level: [1.1.]
       third level: [4. 4.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 4.00 temp_best_value_gen = 4.00
68
     No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 2
69
     solution chromosome =
70
       first level: [ [2. 8.]
       second level: [1. 1.]
71
       third level: [4. 4.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obj[gen-1] = 4.00 temp_best_value_gen = 4.00
76
     No, maintain solution and obj[gen] = 4.00, and the tolerance counter = 3
77
78
     solution chromosome =
       first level: [ [2. 8.]
```

```
80
          second level: [1, 1,]
 81
          third level: [4. 4.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 4.00 temp best value gen = 4.00
       No, maintain solution and obj[gen] = \overline{4}.00, and the tolerance_counter = 4
 86
 87
        solution chromosome =
 88
          first level: [ [2. 8.]
 89
          second level: [1, 1,]
 90
          third level: [4. 4.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 4.00 temp_best_value_gen = 4.00
 95
        No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 5
 96
       solution chromosome =
 97
          first level: [ [2. 8.]
 98
          second level: [1. 1.]
 99
          third level: [4, 4,]]
100
       The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
       obj[gen-1] = 4.00 temp best value gen = 4.00
103
104
       No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 6
105
        solution chromosome =
          first level: [ [2. 8.]
106
107
          second level: [1.1.]
108
          third level: [4. 4.]]
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 4.00 temp_best_value_gen = 4.00
113
        No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 7
114
       solution chromosome =
115
          first level: [ [2. 8.]
116
          second level: [1. 1.]
          third level: [4, 4,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 4.00 temp best value gen = 4.00
       No, maintain solution and obj[\overline{gen}] = \overline{4.00}, and the tolerance_counter = 8
122
123
        solution chromosome =
124
          first level: [ [2. 8.]
125
          second level: [1. 1.]
126
          third level: [4. 4.]]
127
        The No. 10 iteration is finished!
128
129
     Beging the No. 11 iteration:
130
        obj[gen-1] = 4.00 temp_best_value_gen = 4.00
131
       No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 9
132
       solution chromosome =
133
          first level: [ [2. 8.]
134
          second level: [1. 1.]
135
          third level: [4, 4,]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 4.00 temp_best_value_gen = 4.00
140
       No, maintain solution and obj[gen] = 4.00, and the tolerance_counter = 10
141
        solution chromosome =
142
          first level: [ [2. 8.]
          second level: [1. 1.]
143
          third level: [4. 4.]]
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. 8.]
152
          second level: [1, 1,]
153
          third level: [4, 4,]]
154
        Objective function values and some other indicators:
155
                                Obj1 = 2.00
          Obj0 = 2.00
                                                       Obj0 + Obj1 = 4.00
156
          Total movement of crane: 0.00
157
          Total waiting time in berth position: 2.00
158
          Total index of q during berthing: 43.00
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: 3.0
                    duration time i: 2.0
                                                       demand i: 160.0
                                                                                     work load i: 160.0
                                                                                                                      work load gap_i: 0
                                                                      bow of i: 4.0
161
          V_id: 1
                                                                                                  tail of i: 12.0
                              li: 8.0
                                                  xi: 8.0
                                                                                                                             gama_i0: 1.0
                                                                                                                                                         gama_i1: 3.0
                    duration_time_i: 2.0
                                                       demand i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                      work load gap_i: 0
```

## unknown

| 162        | Alacrithm Grishad and the total CDU times 21.6 a        |
|------------|---|
| 163<br>164 | Algorithm finished and the total CPU time: 316 s<br>End |
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