```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=51615
2
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_4_4 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 = 12
       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] = 11.00 temp_best_value_gen = 11.00
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 11.00 temp_best_value_gen = 11.00
40
41
     No, maintain solution and obj[gen] = 11.00, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [ 4. 10.5 17. 25.5]
       second level: [0. 1. 1. 2.]
44
       third level: [2. 4. 2. 5.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 11.00 temp_best_value_gen = 11.00
49
50
     No, maintain solution and obj[gen] = 11.00, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [ 4. 10.5 17. 25.5]
52
53
       second level: [0. 1. 1. 2.]
54
       third level: [2. 4. 2. 5.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 11.00 temp best value gen = 11.00
59
     No, maintain solution and obj[gen] = 11.00, and the tolerance_counter = 3
60
     solution chromosome =
61
       first level: [ [ 4. 10.5 17. 25.5]
62
       second level: [0. 1. 1. 2.]
       third level: [2. 4. 2. 5.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 11.00 temp\_best\_value\_gen = 9.10
68
     Yes, update solution and obj[gen] = 9.10
69
     solution chromosome =
       first level: [ [17. 10.5 4. 25.5]
70
71
       second level: [1. 1. 0. 2.]
       third level: [2. 4. 2. 5.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 9.10 temp best value gen = 9.10
76
     No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 1
77
78
     solution chromosome =
       first level: [ [17. 10.5 4. 25.5]
```

```
second level: [1. 1. 0. 2.]
 80
 81
          third level: [2. 4. 2. 5.]]
 82
       The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 9.10 temp best value gen = 9.10
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 2
 86
 87
       solution chromosome =
 88
          first level: [ [17. 10.5 4. 25.5]
 89
          second level: [1. 1. 0. 2.]
 90
          third level: [2. 4. 2. 5.]]
 91
       The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
 95
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 3
 96
       solution chromosome =
 97
          first level: [ [17. 10.5 4. 25.5]
 98
          second level: [1. 1. 0. 2.]
          third level: [2. 4. 2. 5.]]
 99
100
       The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
       obj[gen-1] = 9.10 temp best value gen = 9.10
103
104
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 4
105
       solution chromosome =
          first level: [ [17. 10.5 4. 25.5]
106
          second level: [1. 1. 0. 2.]
107
108
          third level: [2. 4. 2. 5.]]
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
113
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 5
       solution chromosome =
114
115
          first level: [[17. 10.5 4. 25.5]
116
          second level: [1. 1. 0. 2.]
          third level: [2, 4, 2, 5,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 6
122
123
       solution chromosome =
124
          first level: [ [17. 10.5 4. 25.5]
125
          second level: [1. 1. 0. 2.]
126
          third level: [2. 4. 2. 5.]]
127
       The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
131
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 7
132
       solution chromosome =
          first level: [ [17. 10.5 4. 25.5]
133
134
          second level: [1. 1. 0. 2.]
135
          third level: [2, 4, 2, 5,]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
140
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 8
141
       solution chromosome =
142
          first level: [ [17. 10.5 4. 25.5]
143
          second level: [1. 1. 0. 2.]
          third level: [2. 4. 2. 5.]]
144
145
       The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
148
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
149
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 9
150
       solution chromosome =
151
          first level: [ [17. 10.5 4. 25.5]
152
          second level: [1. 1. 0. 2.]
153
          third level: [2, 4, 2, 5,]]
154
       The No. 13 iteration is finished!
155
156 Beging the No. 14 iteration:
       obj[gen-1] = 9.10 temp_best_value_gen = 9.10
157
158
       No, maintain solution and obj[gen] = 9.10, and the tolerance_counter = 10
159
       solution chromosome =
160
          first level: [ [17. 10.5 4. 25.5]
          second level: [1. 1. 0. 2.]
161
162
          third level: [2. 4. 2. 5.]]
       The No. 14 iteration is finished!
163
```

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unknown
164
165
166
167
     The iteration is terminated and then visulize the solution:
168
        solution chromosome =
           first level: [ [17. 10.5 4. 25.5] second level: [1. 1. 0. 2.]
169
170
171
           third level: [2. 4. 2. 5.]]
172
        Objective function values and some other indicators:
                                 Obj1 = 34.00
           Obj0 = 3.00
173
                                                        Obj0 + Obj1 = 37.00
174
           Total movement of crane: 30.00
175
           Total waiting time in berth position: 4.00
176
           Total index of q during berthing: 212.00
177
        Specific arrangement for each vessel:
                                                   xi: 17.0
                                                                          bow of i: 13.0
178
           V\_id{:}\ 0
                               li: 8.0
                                                                                                     tail of i: 21.0
                                                                                                                                 gama_i0: 1.0
                                                                                                                                                             gama_i1: 4
                        duration_time_i: 3.0
                                                           demand_i: 120.0
                                                                                         work load_i: 120.0
                                                                                                                          work load gap_i: 0
                                                                                                                                 gama\_i0{:}~1.0
179
           V\_id{:}\ 1
                               1i: 5.0
                                                   xi: 10.5
                                                                          bow of i: 8.0
                                                                                                     tail of i: 13.0
                                                                                                                                                             gama_i1: 2
                                                           demand_i: 60.0
                                                                                         work load_i: 60.0
                        duration_time_i: 1.0
                                                                                                                          work load gap_i: 0
180
           V_id: 2
                                                   xi: 4.0
                                                                       bow of i: 0.0
                                                                                                                                                        gama_i1: 4.0
                               1i: 8.0
                                                                                                   tail of i: 8.0
                                                                                                                            gama_i0: 0.0
                     duration_time_i: 4.0
                                                        demand i: 160.0
                                                                                       work load_i: 160.0
                                                                                                                       work load gap_i: 0
                                                                                                                                 gama_i0: 2.0
181
           V_id: 3
                               li: 9.0
                                                   xi: 25.5
                                                                         bow of i: 21.0
                                                                                                     tail of i: 30.0
                                                                                                                                                             gama_i1: 3
      .0
                                                           demand_i: 100.0
                                                                                         work load_i: 100.0
                                                                                                                          work load gap_i: 0
                        duration_time_i: 1.0
182
183 Algorithm finished and the total CPU time: 665 s
184 End
185
```