```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=50866
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_6_7 _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 = 18
       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] = 23.80 temp_best_value_gen = 23.80
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 23.80 temp_best_value_gen = 23.80
40
     No, maintain solution and obj[gen] = 23.80, and the tolerance_counter = 1
41
42
     solution chromosome =
43
       first level: [ [ 2.5 8.5 16. 21.5 26.5 28.5]
       second level: [3. 3. 0. 7. 6. 1.]
44
       third level: [2. 6. 2. 2. 2. 2.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 23.80 temp_best_value_gen = 22.70
49
50
     Yes, update solution and obj[gen] = 22.70
51
     solution chromosome =
       first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
52
       second level: [3. 3. 1. 7. 6. 0.]
53
54
       third level: [2. 6. 2. 2. 2. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 22.70 temp best value gen = 22.70
59
     No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
62
       second level: [3. 3. 1. 7. 6. 0.]
       third level: [2. 6. 2. 2. 2. 2.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 22.70 temp_best_value_gen = 22.70
68
     No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 2
69
     solution chromosome =
       first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
70
       second level: [3. 3. 1. 7. 6. 0.]
71
       third level: [2. 6. 2. 2. 2. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 22.70 temp best value gen = 22.70
76
     No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 3
77
78
     solution chromosome =
       first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
```

```
80
           second level: [3. 3. 1. 7. 6. 0.]
 81
          third level: [2. 6. 2. 2. 2. 2.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 22.70 temp_best_value_gen = 22.70
No, maintain solution_and_obj[gen] = 22.70, and the tolerance_counter = 4
 85
 86
 87
        solution chromosome =
 88
          first level: [ 2.5 8.5 26. 21.5 26.5 16. ]
 89
          second level: [3. 3. 1. 7. 6. 0.]
 90
          third level: [2. 6. 2. 2. 2. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 22.70 temp_best_value_gen = 22.70
 94
 95
        No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 5
 96
       solution chromosome =
 97
          first level: [ 2.5 8.5 26. 21.5 26.5 16. ]
 98
          second level: [3. 3. 1. 7. 6. 0.]
 99
          third level: [2. 6. 2. 2. 2. 2.]]
100
       The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
       obj[gen-1] = 22.70 temp best value gen = 22.70
103
104
       No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 6
105
        solution chromosome =
          first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
106
          second level: [3. 3. 1. 7. 6. 0.]
107
108
          third level: [2. 6. 2. 2. 2. 2.]]
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 22.70 temp_best_value_gen = 22.70
113
        No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 7
114
       solution chromosome =
          first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
115
          second level: [3. 3. 1. 7. 6. 0.]
116
          third level: [2. 6. 2. 2. 2. 2.]
117
       The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
       obj[gen-1] = 22.70 temp_best_value_gen = 22.70
121
122
       No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 8
123
        solution chromosome =
124
          first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
          second level: [3. 3. 1. 7. 6. 0.]
125
126
          third level: [2. 6. 2. 2. 2. 2.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
        obj[gen-1] = 22.70 temp_best_value_gen = 22.70
130
131
       No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 9
132
       solution chromosome =
          first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
133
134
          second level: [3. 3. 1. 7. 6. 0.]
135
          third level: [2. 6. 2. 2. 2. 2.]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 22.70 temp_best_value_gen = 22.70
140
       No, maintain solution and obj[gen] = 22.70, and the tolerance_counter = 10
141
        solution chromosome =
142
          first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
143
          second level: [3. 3. 1. 7. 6. 0.]
          third level: [2. 6. 2. 2. 2. 2.]]
144
145
        The No. 12 iteration is finished!
146
147
148 ---
149 The iteration is terminated and then visulize the solution:
150
       solution chromosome =
151
          first level: [ [ 2.5 8.5 26. 21.5 26.5 16. ]
152
           second level: [3. 3. 1. 7. 6. 0.]
153
          third level: [2. 6. 2. 2. 2. 2.]]
154
        Objective function values and some other indicators:
155
                                 Obj1 = 37.00
          Obj0 = 10.00
                                                        Obj0 + Obj1 = 47.00
156
          Total movement of crane: 17.00
157
          Total waiting time in berth position: 20.00
158
          Total index of q during berthing: 562.00
159
        Specific arrangement for each vessel:
160
           V id: 0
                              li: 5.0
                                                   xi: 2.5
                                                                       bow of i: 0.0
                                                                                                   tail of i: 5.0
                                                                                                                             gama i0: 3.0
                                                                                                                                                         gama i1: 5.0
                    duration time i: 2.0
                                                        demand_i: 60.0
                                                                                       work load i: 60.0
                                                                                                                        work load gap_i: 0
161
          V_id: 1
                                                                       bow of i: 5.0
                                                                                                   tail of i: 12.0
                              li: 7.0
                                                   xi: 8.5
                                                                                                                               gama_i0: 3.0
                                                                                                                                                            gama_i1: 5.0
                    duration_time_i: 2.0
                                                        demand i: 160.0
                                                                                       work load_i: 160.0
                                                                                                                        work load gap_i: 0
```

unknown

| 162 | V_id: 2 | li: 8.0 | xi: 26.0 | bow of i: 22.0 | tail of i: 30.0 | gama_i0: 1.0 | gama_i1: 4 |
|-----|--|----------------------|----------|----------------|--------------------|--------------------|------------|
| | .0 | duration_time_i: 3.0 | demand | _i: 120.0 | work load_i: 120.0 | work load gap_i: 0 | |
| 163 | V id: 3 | li: 3.0 | xi: 21.5 | bow of i: 20.0 | tail of i: 23.0 | gama i0: 7.0 | gama il: |
| | 11.0 | duration time i: 4.0 | demai | nd i: 160.0 | work load i: 160.0 | work load gap i: 0 | |
| 164 | V id: 4 | li: 7.0 | xi: 26.5 | bow of i: 23.0 | tail of i: 30.0 | gama i0: 6.0 | gama_i1: 9 |
| | .0 | duration time i: 3.0 | demand | i: 120.0 | work load i: 120.0 | work load gap i: 0 | · - |
| 165 | V id: 5 | li: 3.0 | xi: 16.0 | bow of i: 14.5 | tail of i: 17.5 | gama i0: 0.0 | gama_i1: 3 |
| | .0 | duration time i: 3.0 | demand | i: 120.0 | work load i: 120.0 | work load gap i: 0 | · - |
| 166 | | | - | _ | _ | C 1= | |
| 167 | Algorithm finished and the total CPU time: 888 s | | | | | | |
| 168 | End | | | | | | |
| 169 | | | | | | | |