```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=54774
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_7_6 _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 = 21
       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] = 20.00 temp_best_value_gen = 20.00
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 20.00 temp_best_value_gen = 20.00
40
     No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 1
41
42
     solution chromosome =
43
       first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
       second level: [5. 1. 4. 5. 1. 1. 4.]
44
       third level: [4. 2. 4. 4. 4. 1. 2.]]
45
46
     The No. 1 iteration is finished!
47
   Beging the No. 2 iteration:
obj[gen-1] = 20.00 temp_best_value_gen = 20.00
48
49
50
     No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
52
53
       second level: [5. 1. 4. 5. 1. 1. 4.]
54
       third level: [4. 2. 4. 4. 4. 1. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 20.00 temp best value gen = 20.00
59
     No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 3
60
     solution chromosome =
61
       first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
62
       second level: [5. 1. 4. 5. 1. 1. 4.]
       third level: [4. 2. 4. 4. 4. 1. 2.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 20.00 temp\_best\_value\_gen = 20.00
68
     No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 4
69
     solution chromosome =
70
       first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
71
       second level: [5. 1. 4. 5. 1. 1. 4.]
       third level: [4. 2. 4. 4. 4. 1. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 20.00 temp best value gen = 20.00
76
     No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 5
77
78
     solution chromosome =
        first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
```

```
second level: [5. 1. 4. 5. 1. 1. 4.]
 80
          third level: [4. 2. 4. 4. 4. 1. 2.]]
 81
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
        obj[gen-1] = 20.00 temp best value gen = 20.00
        No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 6
 86
 87
        solution chromosome =
 88
          first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
 89
          second level: [5. 1. 4. 5. 1. 1. 4.]
 90
          third level: [4. 2. 4. 4. 4. 1. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93
     Beging the No. 7 iteration:
        obj[gen-1] = 20.00 temp_best_value_gen = 20.00
 94
 95
        No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 7
 96
        solution chromosome =
          first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
 97
 98
          second level: [5. 1. 4. 5. 1. 1. 4.]
 99
          third level: [4. 2. 4. 4. 4. 1. 2.]]
100
        The No. 7 iteration is finished!
101
     Beging the No. 8 iteration:
102
        obj[gen-1] = 20.00 temp best value gen = 20.00
103
104
        No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 8
105
        solution chromosome =
          first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
106
          second level: [5. 1. 4. 5. 1. 1. 4.]
107
          third level: [4. 2. 4. 4. 4. 1. 2.]]
108
109
        The No. 8 iteration is finished!
110
     Beging the No. 9 iteration:
111
112
        obj[gen-1] = 20.00 temp\_best\_value\_gen = 20.00
        No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 9
113
114
        solution chromosome =
          first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
115
116
          second level: [5. 1. 4. 5. 1. 1. 4.]
          third level: [4. 2. 4. 4. 4. 1. 2.]]
117
118
        The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
        obj[gen-1] = 20.00 temp\_best\_value\_gen = 20.00
122
        No, maintain solution and obj[gen] = 20.00, and the tolerance_counter = 10
123
        solution chromosome =
124
          first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
125
          second level: [5. 1. 4. 5. 1. 1. 4.]
126
          third level: [4. 2. 4. 4. 4. 1. 2.]]
127
        The No. 10 iteration is finished!
128
129
130
131 The iteration is terminated and then visulize the solution:
132
        solution chromosome =
          first level: [ [26.5 7. 12.5 17. 22. 27. 3.5]
133
134
          second level: [5. 1. 4. 5. 1. 1. 4.]
135
          third level: [4. 2. 4. 4. 4. 1. 2.]]
136
        Objective function values and some other indicators:
                                                       Obj0 + Obj1 = 74.00
137
          Obj0 = 7.00
                                 Obj1 = 67.00
138
           Total movement of crane: 46.00
139
          Total waiting time in berth position: 21.00
140
          Total index of q during berthing: 566.00
        Specific arrangement for each vessel:
141
                              li: 4.0
                                                                                                                                gama i0: 5.0
142
           V id: 0
                                                  xi: 26.5
                                                                         bow of i: 24.5
                                                                                                     tail of i: 28.5
                                                                                                                                                            gama i1:7
                                                          demand_i: 100.0
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 2.0
                                                                                        work load_i: 100.0
143
           V_id: 1
                              li: 6.0
                                                   xi: 7.0
                                                                       bow of i: 4.0
                                                                                                  tail of i: 10.0
                                                                                                                              gama_i0: 1.0
                                                                                                                                                          gama_i1: 4.0
                     duration_time_i: 3.0
                                                        demand_i: 100.0
                                                                                      work load_i: 100.0
                                                                                                                       work load gap_i: 0
144
           V id: 2
                                                                         bow of i: 10.0
                                                                                                     tail of i: 15.0
                                                                                                                                 gama i0: 4.0
                              li: 5.0
                                                  xi: 12.5
                                                                                                                                                            gama il: 6
                       duration time i: 2.0
                                                          demand_i: 140.0
                                                                                        work load_i: 140.0
                                                                                                                         work load gap_i: 0
      .0
                                                                                                                                 gama_i0: 5.0
145
           V id: 3
                              li: 4.0
                                                   xi: 17.0
                                                                         bow of i: 15.0
                                                                                                     tail of i: 19.0
                                                                                                                                                            gama i1:7
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 2.0
                                                          demand_i: 140.0
                                                                                        work load_i: 140.0
146
                                                                         bow of i: 19.0
                                                                                                                                gama_i0: 1.0
           V_id: 4
                                                   xi: 22.0
                                                                                                     tail of i: 25.0
                              li: 6.0
                                                                                                                                                            gama i1:3
                                                                                                                         work load gap_i: 0
      .0
                       duration_time_i: 2.0
                                                          demand_i: 160.0
                                                                                        work load_i: 160.0
                                                                         bow of i: 25.0
147
           V_id: 5
                              li: 4.0
                                                   xi: 27.0
                                                                                                     tail of i: 29.0
                                                                                                                                 gama_i0: 1.0
                                                                                                                                                            gama_i1: 5
                                                          demand_i: 80.0
                                                                                                                         work load gap i: 0
                       duration time i: 4.0
                                                                                        work load i: 80.0
148
           V id: 6
                                                   xi: 3.5
                                                                       bow of i: 0.0
                              1i: 7.0
                                                                                                  tail of i: 7.0
                                                                                                                            gama_i0: 4.0
                                                                                                                                                       gama_i1: 8.0
                     duration time i: 4.0
                                                        demand i: 140.0
                                                                                      work load i: 140.0
                                                                                                                       work load gap i: 0
149
150 Algorithm finished and the total CPU time: 805 s
151 End
152
```