```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=55055
2
3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   01_My_Python_Code'])
5
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_1 _standard_test.xlsx optimization process solved by ENSGA-II algorithm.
14
15
   Start
16
17
   Before iteration:
     Read basic data
18
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] = 31.90 temp_best_value_gen = 31.90
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 31.90 temp_best_value_gen = 31.90
40
     No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 1
41
42
     solution chromosome =
43
       first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
       second level: [1. 0. 6. 2. 10. 6.]
44
       third level: [3. 2. 4. 2. 2. 2.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 31.90 temp_best_value_gen = 31.90
49
50
     No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
52
53
       second level: [1. 0. 6. 2. 10. 6.]
54
       third level: [3. 2. 4. 2. 2. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 31.90 temp best value gen = 31.90
59
     No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 3
60
     solution chromosome =
61
       first level: [[2.5 8. 14. 19.5 23.5 27.]
62
       second level: [1. 0. 6. 2. 10. 6.]
63
       third level: [3. 2. 4. 2. 2. 2.]
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 31.90 temp_best_value_gen = 31.90
68
     No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 4
69
     solution chromosome =
       first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
70
       second level: [1. 0. 6. 2. 10. 6.]
71
       third level: [3. 2. 4. 2. 2. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 31.90 temp best value gen = 31.90
76
     No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 5
77
     solution chromosome =
78
       first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
```

```
80
          second level: [1. 0. 6. 2. 10. 6.]
 81
          third level: [3. 2. 4. 2. 2. 2.]]
        The No. 5 iteration is finished!
 82
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 31.90 temp best value gen = 31.90
       No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 6
 86
 87
        solution chromosome =
 88
          first level: [ 2.5 8. 14. 19.5 23.5 27. ]
 89
          second level: [1. 0. 6. 2. 10. 6.]
 90
          third level: [3. 2. 4. 2. 2. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93
     Beging the No. 7 iteration:
        obj[gen-1] = 31.90 temp_best_value_gen = 31.90
 94
 95
        No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 7
 96
       solution chromosome =
 97
          first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
 98
          second level: [1. 0. 6. 2. 10. 6.]
 99
          third level: [3. 2. 4. 2. 2. 2.]]
100
        The No. 7 iteration is finished!
101
     Beging the No. 8 iteration:
102
       obj[gen-1] = 31.90 temp best value gen = 31.90
103
104
       No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 8
105
        solution chromosome =
          first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
106
          second level: [1. 0. 6. 2. 10. 6.]
107
108
          third level: [3. 2. 4. 2. 2. 2.]]
109
        The No. 8 iteration is finished!
110
     Beging the No. 9 iteration:
111
112
        obj[gen-1] = 31.90 temp_best_value_gen = 31.90
113
        No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 9
114
       solution chromosome =
115
          first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
          second level: [1. 0. 6. 2. 10. 6.]
116
          third level: [3. 2. 4. 2. 2. 2.]]
117
       The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
       obj[gen-1] = 31.90 temp_best_value_gen = 31.90
121
       No, maintain solution and obj[gen] = 31.90, and the tolerance_counter = 10
122
123
        solution chromosome =
124
          first level: [ [ 2.5 8. 14. 19.5 23.5 27. ]
125
          second level: [1. 0. 6. 2. 10. 6.]
          third level: [3. 2. 4. 2. 2. 2.]]
126
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: [ [ 2.5 8. 14. 19.5 23.5 27. ]
133
134
          second level: [1. 0. 6. 2. 10. 6.]
135
          third level: [3. 2. 4. 2. 2. 2.]]
136
        Objective function values and some other indicators:
          Obj0 = 14.00
                                                       Obj0 + Obj1 = 67.00
137
                                Obj1 = 53.00
138
          Total movement of crane: 28.00
139
          Total waiting time in berth position: 25.00
140
          Total index of q during berthing: 713.00
141
        Specific arrangement for each vessel:
                             li: 5.0
                                                                                                                          gama i0: 1.0
142
          V_id: 0
                                                                      bow of i: 0.0
                                                                                                 tail of i: 5.0
                                                                                                                                                     gama i1: 3.0
                    duration_time_i: 2.0
                                                       demand_i: 80.0
                                                                                     work load_i: 80.0
                                                                                                                     work load gap_i: 0
143
          V_id: 1
                              li: 6.0
                                                  xi: 8.0
                                                                      bow of i: 5.0
                                                                                                 tail of i: 11.0
                                                                                                                            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
144
          V_id: 2
                                                                        bow of i: 11.0
                                                                                                   tail of i: 17.0
                                                                                                                               gama i0: 6.0
                              li: 6.0
                                                  xi: 14.0
                                                                                                                                                           gama_i1:
                                                                                                                          work load gap_i: 0
     10.0
                         duration_time_i: 4.0
                                                            demand_i: 260.0
                                                                                          work load i: 260.0
145
          V id: 3
                              li: 5.0
                                                  xi: 19.5
                                                                        bow of i: 17.0
                                                                                                   tail of i: 22.0
                                                                                                                               gama_i0: 2.0
                                                                                                                                                           gama i1:4
                                                         demand_i: 80.0
                                                                                       work load_i: 80.0
                                                                                                                        work load gap_i: 0
     .0
                      duration_time_i: 2.0
                                                  xi: 23.5
                                                                        bow of i: 22.0
                                                                                                   tail of i: 25.0
                                                                                                                               gama_i0: 10.0
146
          V_id: 4
                              li: 3.0
                                                                                                                                                           gama il:
     15.0
                         duration_time_i: 5.0
                                                            demand_i: 200.0
                                                                                          work load_i: 200.0
                                                                                                                          work load gap_i: 0
147
          V_id: 5
                                                  xi: 27.0
                                                                        bow of i: 25.0
                                                                                                   tail of i: 29.0
                                                                                                                               gama_i0: 6.0
                                                                                                                                                           gama_i1:
                              li: 4.0
     12.0
                         duration time i: 6.0
                                                            demand i: 220.0
                                                                                          work load i: 220.0
                                                                                                                          work load gap i: 0
148
     Algorithm finished and the total CPU time: 745 s
149
150 End
151
```