```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=50086
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_5 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] = 23.73 temp_best_value_gen = 23.73
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 23.73 temp_best_value_gen = 23.73
40
     No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 1
41
42
     solution chromosome =
43
       first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
       second level: [0. 4. 1. 5. 7. 9.]
44
       third level: [4. 9. 2. 4. 5. 8.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
obj[gen-1] = 23.73 temp_best_value_gen = 23.73
49
50
     No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
52
53
       second level: [0. 4. 1. 5. 7. 9.]
54
       third level: [4. 9. 2. 4. 5. 8.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 23.73 temp best value gen = 23.73
     No, maintain solution and obj[gen] = \overline{23.73}, and the tolerance_counter = 3
59
60
     solution chromosome =
61
       first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
62
       second level: [0. 4. 1. 5. 7. 9.]
       third level: [4. 9. 2. 4. 5. 8.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
     obj[gen-1] = 23.73 temp_best_value_gen = 23.73
67
68
     No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 4
69
     solution chromosome =
       first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
70
       second level: [0. 4. 1. 5. 7. 9.]
71
       third level: [4. 9. 2. 4. 5. 8.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 23.73 temp best value gen = 23.73
76
     No, maintain solution and obj[\overline{gen}] = \overline{23.73}, and the tolerance_counter = 5
77
     solution chromosome =
78
        first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
```

```
80
           second level: [0. 4. 1. 5. 7. 9.]
 81
          third level: [4. 9. 2. 4. 5. 8.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 84
       obj[gen-1] = 23.73 temp_best_value_gen = 23.73
No, maintain solution_and_obj[gen] = 23.73, and the tolerance_counter = 6
 85
 86
 87
        solution chromosome =
 88
          first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
 89
          second level: [0. 4. 1. 5. 7. 9.]
 90
          third level: [4. 9. 2. 4. 5. 8.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 23.73 temp_best_value_gen = 23.73
 94
 95
        No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 7
 96
        solution chromosome =
 97
          first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
 98
          second level: [0. 4. 1. 5. 7. 9.]
 99
          third level: [4. 9. 2. 4. 5. 8.]]
100
        The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
103
        obj[gen-1] = 23.73 temp best value gen = 23.73
104
        No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 8
105
        solution chromosome =
          first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
106
          second level: [0. 4. 1. 5. 7. 9.]
107
108
          third level: [4. 9. 2. 4. 5. 8.]]
109
        The No. 8 iteration is finished!
110
     Beging the No. 9 iteration:
111
112
        obj[gen-1] = 23.73 temp_best_value_gen = 23.73
113
        No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 9
114
        solution chromosome =
          first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
115
116
          second level: [0. 4. 1. 5. 7. 9.]
          third level: [4. 9. 2. 4. 5. 8.]]
117
        The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
121
        obj[gen-1] = 23.73 temp_best_value_gen = 23.73
        No, maintain solution and obj[gen] = 23.73, and the tolerance_counter = 10
122
123
        solution chromosome =
124
          first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
125
          second level: [0. 4. 1. 5. 7. 9.]
126
          third level: [4. 9. 2. 4. 5. 8.]]
127
        The No. 10 iteration is finished!
128
129
130
131 The iteration is terminated and then visulize the solution:
132
        solution chromosome =
133
          first level: [ [4.12 7.26 2.43 4.04 3.44 4.88]
134
          second level: [0. 4. 1. 5. 7. 9.]
135
          third level: [4, 9, 2, 4, 5, 8,]]
136
        Objective function values and some other indicators:
          Obj0 = 9.00
                                                        Obj0 + Obj1 = 75.33
137
                                 Obj1 = 66.33
138
           Total movement of crane: 40.33
139
          Total waiting time in berth position: 26.00
140
          Total index of q during berthing: 90.00
141
        Specific arrangement for each vessel:
                                                                                                                             gama i0: 0.0
142
          V_id: 0
                              li: 8.0
                                                   xi: 4.1
                                                                        bow of i: 0.1
                                                                                                    tail of i: 8.1
                                                                                                                                                         gama i1: 1.0
                    duration_time_i: 1.0
                                                        demand_i: 60.0
                                                                                       work load_i: 60.0
                                                                                                                        work load gap_i: 0
143
          V\_id{:}\ 1
                              li: 9.0
                                                    xi: 7.3
                                                                        bow of i: 2.8
                                                                                                    tail of i: 11.8
                                                                                                                                gama_i0: 4.0
                                                                                                                                                            gama_i1: 5.0
                                                        demand_i: 140.0
                                                                                       work load_i: 140.0
                                                                                                                        work load gap_i: 0
                    duration_time_i: 1.0
144
          V id: 2
                                                   xi: 2.4
                                                                        bow of i: 0.9
                                                                                                    tail of i: 3.9
                                                                                                                             gama i0: 1.0
                              li: 3.0
                                                                                                                                                          gama_i1: 4.0
                     duration_time_i: 3.0
                                                        demand\_i{:}\ 100.0
                                                                                       work load i: 100.0
                                                                                                                        work load gap i: 0
          V id: 3
                                                                        bow of i: 1.5
145
                              li: 5.0
                                                   xi: 4.0
                                                                                                    tail of i: 6.5
                                                                                                                             gama_i0: 5.0
                                                                                                                                                          gama i1: 7.0
                                                        demand_i: 140.0
                                                                                       work load_i: 140.0
                                                                                                                        work load gap_i: 0
                    duration_time_i: 2.0
146
          V_id: 4
                                                                        bow of i: 0.4
                                                                                                    tail of i: 6.4
                                                                                                                             gama_i0: 7.0
                                                                                                                                                          gama_i1: 9.0
                              li: 6.0
                                                   xi: 3.4
                     duration_time_i: 2.0
                                                        demand_i: 160.0
                                                                                       work load_i: 160.0
                                                                                                                        work load gap_i: 0
147
           V id: 5
                              li: 8.0
                                                   xi: 4.9
                                                                        bow of i: 0.9
                                                                                                    tail of i: 8.9
                                                                                                                             gama_i0: 9.0
                                                                                                                                                          gama_i1: 10.0
                                                        demand i: 140.0
                                                                                       work load i: 140.0
                    duration time i: 1.0
                                                                                                                        work load gap i: 0
148
149 Algorithm finished and the total CPU time: 753 s
150 End
151
```