```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=6859
 2
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
     sys.path.extend([E:\\] ===\\\\3 ====\\\\1 =====\\\1 =====\\\1 =====\\\1 =====\\\1 =====\\\1 =====\\\1 =====\\\1 ====\\\1 =====\\\1 ====\\\1 ====\\\1 ====\\\1 ====\\\1 ===\\\1 ===\\\1 ==\\\1 ===\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 ==\\\1 =\\\1 ==\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 =\\\1 
      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_14_10 _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 = 42
             Iter_num_GA = 300
24
25
             Select_rate = 0.85
26
             Crossover rate = 0.95
27
             Mutation rate = 0.95
28
             Mu_oper_type = 1
29
             vessel\_move\_way = 2
30
             coefficient for Obj1= 1.9
             coefficient for Obj2= 0.100000000000000009
31
32
33
34
      Iteration begin:
35
     Beging the No. 0 iteration:
         obj[0] = 65.90 temp_best_value_gen = 65.90
36
         The No. 0 iteration is finished!
37
38
39
     Beging the No. 1 iteration:
         obj[gen-1] = 65.90 temp_best_value_gen = 65.90
40
         No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 1
41
42
         solution chromosome =
43
             first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
             second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
44
             third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 65.90 temp_best_value_gen = 65.90
49
50
         No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 2
51
         solution chromosome =
52
             first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 4. 2. 4. 2.5 2. 3. ]
53
             second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
54
             third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
55
         The No. 2 iteration is finished!
56
57
     Beging the No. 3 iteration:
58
         obi[gen-1] = 65.90 temp best value gen = 65.90
59
         No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 3
60
         solution chromosome =
             first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
61
             second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
62
             third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
63
         The No. 3 iteration is finished!
64
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 65.90 temp_best_value_gen = 65.90
68
         No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 4
69
         solution chromosome =
70
             first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
             second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
71
             third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obi[gen-1] = 65.90 temp best value gen = 65.90
76
         No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 5
77
78
         solution chromosome =
             first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
79
```

```
second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
 80
 81
          third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obi[gen-1] = 65.90 temp best value gen = 65.90
       No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 6
 86
 87
        solution chromosome =
 88
          first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
 89
          second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
 90
          third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93
     Beging the No. 7 iteration:
 94
        obj[gen-1] = 65.90 temp_best_value_gen = 65.90
 95
        No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 7
 96
       solution chromosome =
 97
          first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 4. 2. 4. 2.5 2. 3. ]
 98
          second level: [6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
 99
          third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
100
        The No. 7 iteration is finished!
101
     Beging the No. 8 iteration:
102
       obj[gen-1] = 65.90 temp best value gen = 65.90
103
       No, maintain solution and obj[gen] = 65.90, and the tolerance_counter = 8
104
105
        solution chromosome =
          first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
106
107
          second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
          third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
108
109
        The No. 8 iteration is finished!
110
111
112
113
     The iteration is terminated and then visulize the solution:
114
       solution chromosome =
          first level: [ [ 4. 10.5 17. 25. 28.5 4.5 4. 4. 4. 2. 4. 2.5 2. 3. ]
115
116
          second level: [ 6. 4. 2. 1. 4. 11. 4. 8. 9. 16. 0. 13. 1. 18.]
          third level: [3. 3. 5. 8. 3. 4. 3. 3. 2. 3. 7. 3. 2. 2.]]
117
118
        Objective function values and some other indicators:
119
          Obi0 = 21.00
                                 Obj1 = 260.00
                                                          Obj0 + Obj1 = 281.00
120
          Total movement of crane: 62.00
121
          Total waiting time in berth position: 97.00
122
          Total index of q during berthing: 293.00
123
        Specific arrangement for each vessel:
124
          V_id: 0
                              li: 8.0
                                                  xi: 4.0
                                                                       bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama_i0: 6.0
                                                                                                                                                       gama_i1: 8.0
                    duration_time_i: 2.0
                                                       demand i: 120.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap i: 0
125
          V_id: 1
                                                                         bow of i: 8.0
                              li: 5.0
                                                  xi: 10.5
                                                                                                     tail of i: 13.0
                                                                                                                                 gama_i0: 4.0
                                                                                                                                                            gama_i1: 6
                                                          demand_i: 100.0
     .0
                       duration_time_i: 2.0
                                                                                        work load_i: 100.0
                                                                                                                         work load gap_i: 0
126
          V_id: 2
                              li: 8.0
                                                                         bow of i: 13.0
                                                                                                     tail of i: 21.0
                                                                                                                                gama i0: 2.0
                                                  xi: 17.0
                                                                                                                                                            gama i1:3
     .0
                       duration_time_i: 1.0
                                                          demand i: 100.0
                                                                                        work load i: 100.0
                                                                                                                         work load gap_i: 0
127
          V id: 3
                              li: 8.0
                                                  xi: 25.0
                                                                         bow of i: 21.0
                                                                                                     tail of i: 29.0
                                                                                                                                 gama i0: 1.0
                                                                                                                                                            gama i1:2
                                                          demand_i: 60.0
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 1.0
                                                                                        work load_i: 60.0
128
          V id: 4
                                                                         bow of i: 27.0
                              li: 3.0
                                                  xi: 28.5
                                                                                                     tail of i: 30.0
                                                                                                                                gama i0: 4.0
                                                                                                                                                            gama i1:5
                                                          demand_i: 60.0
                                                                                        work load i: 60.0
                       duration_time_i: 1.0
                                                                                                                         work load gap_i: 0
129
          V_id: 5
                              li: 9.0
                                                  xi: 4.5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 9.0
                                                                                                                           gama_i0: 11.0
                                                                                                                                                       gama_i1: 13.0
                    duration time i: 2.0
                                                       demand i: 140.0
                                                                                      work load i: 140.0
                                                                                                                       work load gap i: 0
130
          V_id: 6
                              li: 8.0
                                                  xi: 4.0
                                                                      bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama i0: 4.0
                                                                                                                                                       gama i1: 6.0
                    duration_time_i: 2.0
                                                       demand_i: 120.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
131
          V_id: 7
                              li: 8.0
                                                  xi: 4.0
                                                                       bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama_i0: 8.0
                                                                                                                                                       gama_i1: 9.0
                    duration_time_i: 1.0
                                                       demand i: 60.0
                                                                                                                       work load gap_i: 0
                                                                                      work load i: 60.0
                                                                      bow of i: 0.0
                                                                                                                           gama_i0: 9.0
132
          V id: 8
                              1i: 8.0
                                                  xi: 4.0
                                                                                                  tail of i: 8.0
                                                                                                                                                       gama_i1: 11.0
                    duration_time_i: 2.0
                                                        demand i: 80.0
                                                                                      work load i: 80.0
                                                                                                                       work load gap i: 0
133
          V id: 9
                              li: 3.0
                                                  xi: 2.0
                                                                      bow of i: 0.5
                                                                                                  tail of i: 3.5
                                                                                                                           gama i0: 16.0
                                                                                                                                                       gama i1: 17.0
                                                       demand_i: 60.0
                                                                                      work load_i: 60.0
                                                                                                                       work load gap_i: 0
                    duration_time_i: 1.0
134
          V_id: 10
                                li: 8.0
                                                     xi: 4.0
                                                                         bow of i: 0.0
                                                                                                     tail of i: 8.0
                                                                                                                              gama_i0: 0.0
                                                                                                                                                          gama_i1: 1.0
                                                       demand_i: 80.0
                                                                                      work load_i: 80.0
                                                                                                                       work load gap_i: 0
                    duration_time_i: 1.0
135
          V id: 11
                                                                         bow of i: 0.0
                                                                                                     tail of i: 5.0
                                                                                                                              gama i0: 13.0
                                li: 5.0
                                                     xi: 2.5
                                                                                                                                                          gama i1: 16.
     0
                                                       demand i: 160.0
                                                                                      work load i: 160.0
                                                                                                                       work load gap i: 0
                    duration_time_i: 3.0
136
                                                                         bow of i: 0.0
          V id: 12
                                li: 4.0
                                                     xi: 2.0
                                                                                                     tail of i: 4.0
                                                                                                                              gama i0: 1.0
                                                                                                                                                          gama i1: 4.0
                                                       demand_i: 120.0
                    duration_time_i: 3.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
          V id: 13
                                                                         bow of i: 0.0
                                                                                                                              gama_i0: 18.0
137
                                                     xi: 3.0
                                                                                                     tail of i: 6.0
                                                                                                                                                          gama_i1: 22.
                                li: 6.0
                                                       demand_i: 140.0
                    duration_time_i: 4.0
                                                                                      work load i: 140.0
                                                                                                                      work load gap_i: 0
     0
138
139 Algorithm finished and the total CPU time: 1315 s
140 End
141
```