```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=6564
 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_17_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 = 51
             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
     Iteration begin:
34
35
     Beging the No. 0 iteration:
         obj[0] = 65.70 temp_best_value_gen = 65.70
36
         The No. 0 iteration is finished!
37
38
39 Beging the No. 1 iteration:
         obj[gen-1] = 65.70 temp_best_value_gen = 65.70
40
         No, maintain solution and obj[gen] = 65.70, and the tolerance_counter = 1
41
42
         solution chromosome =
43
             first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
44
       4.5 4.5 2.5]
45
             second level: [2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.]
             third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
46
47
         The No. 1 iteration is finished!
48
     Beging the No. 2 iteration:
49
50
         obj[gen-1] = 65.70 temp_best_value_gen = 65.70
51
         No, maintain solution and obj[gen] = 65.70, and the tolerance_counter = 2
52
         solution chromosome =
53
             first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
54
       4.5 4.5 2.5]
55
             second level: [2, 3, 6, 2, 2, 6, 4, 0, 2, 9, 13, 16, 17, 19, 20, 21, 22,]
             third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
56
57
         The No. 2 iteration is finished!
58
59 Beging the No. 3 iteration:
         obj[gen-1] = 65.70 temp_best_value_gen = 65.70
60
         No, maintain solution and obj[gen] = 65.70, and the tolerance_counter = 3
61
62
         solution chromosome =
63
             first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
       4.5 4.5 2.5]
64
             second level: [2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.]
65
             third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
66
67
         The No. 3 iteration is finished!
68
69 Beging the No. 4 iteration:
         obj[gen-1] = 65.70 temp_best_value_gen = 65.70
70
71
         No, maintain solution and obj[gen] = 65.70, and the tolerance_counter = 4
         solution chromosome
73
             first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
74
75
             second level: [2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.]
             third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
76
         The No. 4 iteration is finished!
77
78
     Beging the No. 5 iteration:
79
```

```
obj[gen-1] = 65.70 temp_best_value_gen = 65.70
 80
        No, maintain solution and obj[\overline{gen}] = \overline{65.70}, and the tolerance_counter = 5
 81
 82
        solution chromosome =
 83
          first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
       4.5 4.5 2.51
 85
          second level: [2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.]
          third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
 86
 87
        The No. 5 iteration is finished!
 88
 89
     Beging the No. 6 iteration:
 90
        obj[gen-1] = 65.70 temp_best_value_gen = 65.70
 91
        No, maintain solution and obj[gen] = 65.70, and the tolerance_counter = 6
 92
        solution chromosome =
 93
          first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
 94
       4.5 4.5 2.5]
 95
          second level: [ 2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.]
          third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
 96
 97
        The No. 6 iteration is finished!
 98
 99
     Beging the No. 7 iteration:
100
        obj[gen-1] = 65.70 temp_best_value_gen = 65.70
101
        No, maintain solution and obj[gen] = 65.70, and the tolerance_counter = 7
102
        solution chromosome =
          first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
103
104
       4.5 4.5 2.5]
105
          second level: [2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.]
          third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
106
        The No. 7 iteration is finished!
107
108
109
110
111 The iteration is terminated and then visulize the solution:
112
        solution chromosome =
          first level: [ [ 4.5 11.5 2.5 22. 27. 27. 1.5 4. 16.5 3.5 4. 4.5 4.5 4.5
113
114
       4.5 4.5 2.51
          second level: [2. 3. 6. 2. 2. 6. 4. 0. 2. 9. 13. 16. 17. 19. 20. 21. 22.] third level: [2. 2. 3. 2. 4. 2. 3. 5. 2. 2. 3. 5. 2. 6. 8. 9. 4.]]
115
116
117
        Objective function values and some other indicators:
                                 Obj1 = 220.00
          Obi0 = 23.00
                                                           Obj0 + Obj1 = 243.00
118
119
           Total movement of crane: 56.00
120
          Total waiting time in berth position: 164.00
121
          Total index of q during berthing: 689.00
122
        Specific arrangement for each vessel:
123
           V_id: 0
                               li: 9.0
                                                    xi: 4.5
                                                                        bow of i: 0.0
                                                                                                    tail of i: 9.0
                                                                                                                              gama_i0: 2.0
                                                                                                                                                          gama i1: 4.0
                     duration_time_i: 2.0
                                                         demand_i: 60.0
                                                                                       work load_i: 60.0
                                                                                                                         work load gap_i: 0
124
           V_id: 1
                               li: 5.0
                                                    xi: 11.5
                                                                          bow of i: 9.0
                                                                                                       tail of i: 14.0
                                                                                                                                   gama_i0: 3.0
                                                                                                                                                               gama_i1: 7
      .0
                       duration_time_i: 4.0
                                                           demand_i: 160.0
                                                                                          work load_i: 160.0
                                                                                                                           work load gap_i: 0
                                                                                                                                                          gama_i1: 9.0
125
           V_id: 2
                               li: 5.0
                                                    xi: 2.5
                                                                        bow of i: 0.0
                                                                                                    tail of i: 5.0
                                                                                                                              gama_i0: 6.0
                     duration time i: 3.0
                                                        demand i: 140.0
                                                                                       work load i: 140.0
                                                                                                                         work load gap i: 0
                                                                          bow of i: 19.0
126
                                                                                                                                   gama_i0: 2.0
           V id: 3
                               li: 6.0
                                                    xi: 22.0
                                                                                                       tail of i: 25.0
                                                                                                                                                               gama i1: 6
     .0
                        duration time i: 4.0
                                                           demand i: 160.0
                                                                                          work load i: 160.0
                                                                                                                           work load gap i: 0
127
           V_id: 4
                               li: 4.0
                                                                          bow of i: 25.0
                                                                                                       tail of i: 29.0
                                                                                                                                   gama_i0: 2.0
                                                                                                                                                               gama_i1: 4
                                                                                                                           work load gap_i: 0
      .0
                       duration_time_i: 2.0
                                                           demand i: 100.0
                                                                                          work load i: 100.0
                                                                                                       tail of i: 30.0
128
           V_id: 5
                               li: 6.0
                                                    xi: 27.0
                                                                          bow of i: 24.0
                                                                                                                                   gama_i0: 6.0
                                                                                                                                                               gama_i1:
     10.0
                          duration_time_i: 4.0
                                                             demand_i: 140.0
                                                                                             work load i: 140.0
                                                                                                                              work load gap_i: 0
129
           V id: 6
                                                   xi: 1.5
                                                                        bow of i: 0.0
                                                                                                    tail of i: 3.0
                                                                                                                              gama i0: 4.0
                                                                                                                                                          gama i1: 6.0
                               li: 3.0
                     duration_time_i: 2.0
                                                         demand i: 80.0
                                                                                       work load i: 80.0
                                                                                                                         work load gap i: 0
130
           V_id: 7
                               1i: 8.0
                                                    xi: 4.0
                                                                        bow of i: 0.0
                                                                                                    tail of i: 8.0
                                                                                                                              gama_i0: 0.0
                                                                                                                                                          gama_i1: 2.0
                     duration_time_i: 2.0
                                                        demand_i: 120.0
                                                                                        work load_i: 120.0
                                                                                                                         work load gap_i: 0
                                                                                                                                   gama_i0: 2.0
131
           V_id: 8
                                                                          bow of i: 15.0
                                                                                                       tail of i: 18.0
                                                                                                                                                               gama_i1: 6
                               li: 3.0
                                                    xi: 16.5
     .0
                        duration_time_i: 4.0
                                                           demand i: 160.0
                                                                                          work load i: 160.0
                                                                                                                           work load gap_i: 0
132
                                                    xi: 3.5
                                                                        bow of i: 0.0
                                                                                                    tail of i: 7.0
                                                                                                                              gama i0: 9.0
                                                                                                                                                          gama i1: 13.0
           V id: 9
                               li: 7.0
                     duration time i: 4.0
                                                        demand i: 160.0
                                                                                       work load i: 160.0
                                                                                                                         work load gap i: 0
133
           V_id: 10
                                                                          bow of i: 0.0
                                 li: 8.0
                                                                                                       tail of i: 8.0
                                                                                                                                gama i0: 13.0
                                                                                                                                                             gama i1: 16.
                                                      xi: 4.0
     0
                     duration_time_i: 3.0
                                                         demand_i: 160.0
                                                                                        work load_i: 160.0
                                                                                                                         work load gap_i: 0
134
           V_id: 11
                                                                          bow of i: 0.0
                                                                                                       tail of i: 9.0
                                 li: 9.0
                                                      xi: 4.5
                                                                                                                                gama_i0: 16.0
                                                                                                                                                             gama_i1: 17.
     0
                                                        demand i: 60.0
                                                                                                                         work load gap i: 0
                    duration time i: 1.0
                                                                                       work load i: 60.0
135
                                                                                                                                gama_i0: 17.0
           V id: 12
                                 li: 9.0
                                                      xi: 4.5
                                                                          bow of i: 0.0
                                                                                                       tail of i: 9.0
                                                                                                                                                             gama_i1: 19.
     0
                     duration_time_i: 2.0
                                                         demand i: 80.0
                                                                                        work load_i: 80.0
                                                                                                                         work load gap i: 0
136
           V_id: 13
                                                                          bow of i: 0.0
                                 li: 9.0
                                                      xi: 4.5
                                                                                                       tail of i: 9.0
                                                                                                                                gama_i0: 19.0
                                                                                                                                                             gama_i1: 20.
     0
                                                        demand_i: 60.0
                     duration_time_i: 1.0
                                                                                       work load i: 60.0
                                                                                                                         work load gap i: 0
137
           V_id: 14
                                 li: 9.0
                                                      xi: 4.5
                                                                          bow of i: 0.0
                                                                                                       tail of i: 9.0
                                                                                                                                gama_i0: 20.0
                                                                                                                                                             gama_i1: 21.
     0
                                                                                                                         work load gap_i: 0
                     duration_time_i: 1.0
                                                        demand_i: 140.0
                                                                                        work load i: 140.0
                                                      xi: 4.5
138
           V id: 15
                                 li: 9.0
                                                                          bow of i: 0.0
                                                                                                       tail of i: 9.0
                                                                                                                                gama i0: 21.0
                                                                                                                                                             gama_i1: 22.
                                                        demand_i: 120.0
     0
                     duration_time_i: 1.0
                                                                                       work load_i: 120.0
                                                                                                                         work load gap_i: 0
139
           V id: 16
                                 li: 5.0
                                                      xi: 2.5
                                                                          bow of i: 0.0
                                                                                                       tail of i: 5.0
                                                                                                                                gama i0: 22.0
                                                                                                                                                             gama i1: 24.
     0
                     duration_time_i: 2.0
                                                        demand_i: 120.0
                                                                                       work load_i: 120.0
                                                                                                                         work load gap_i: 0
140
     Algorithm finished and the total CPU time: 1278 s
141
142
     End
143
```