```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=36113
 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.
 8 Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
     python code/01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
     Waiting 1s.....
12
13
     This is the R_16_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 = 48
             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] = 49.10 temp_best_value_gen = 49.10
36
         The No. 0 iteration is finished!
37
38
39 Beging the No. 1 iteration:
         obj[gen-1] = 49.10 temp_best_value_gen = 49.10
40
         No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 1
41
42
         solution chromosome =
43
             first level: [ [ 3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
44
       3.5 2. ]
45
             second level: [ 0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.]
             third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]]
46
47
         The No. 1 iteration is finished!
48
     Beging the No. 2 iteration:
49
50
         obj[gen-1] = 49.10 temp_best_value_gen = 49.10
51
         No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 2
52
         solution chromosome =
53
             first level: [[3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
54
       3.5 2.]
55
             second level: [0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.]
56
             third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]]
57
         The No. 2 iteration is finished!
58
59
     Beging the No. 3 iteration:
         obj[gen-1] = 49.10 temp_best_value_gen = 49.10
60
         No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 3
61
62
         solution chromosome =
             first level: [ [ 3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5 ]
63
       3.5 2.]
64
65
             second level: [0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.]
             third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]]
66
67
         The No. 3 iteration is finished!
68
69 Beging the No. 4 iteration:
         obj[gen-1] = 49.10 temp_best_value_gen = 49.10
70
71
         No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 4
         solution chromosome =
73
             first level: [ [ 3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
74
       3.5 2. ]
75
             second level: [0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.]
             third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]]
76
         The No. 4 iteration is finished!
77
78
     Beging the No. 5 iteration:
79
```

```
obj[gen-1] = 49.10 temp_best_value_gen = 49.10
 80
 81
        No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 5
 82
        solution chromosome =
 83
          first level: [ [ 3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
 84
      3.5 2.1
          second level: [ 0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.] third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.] ]
 85
 86
 87
        The No. 5 iteration is finished!
 88
 89
     Beging the No. 6 iteration:
        obj[gen-1] = 49.10 temp_best_value_gen = 49.10
 90
 91
        No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 6
 92
        solution chromosome =
 93
          first level: [ [ 3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
 94
      3.5 2.]
 95
          second level: [0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.]
          third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]]
 96
 97
        The No. 6 iteration is finished!
 98
 99
     Beging the No. 7 iteration:
100
        obj[gen-1] = 49.10 temp_best_value_gen = 49.10
101
        No, maintain solution and obj[gen] = 49.10, and the tolerance_counter = 7
102
        solution chromosome =
          first level: [[3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
103
      3.5 2.]
104
105
          second level: [0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9. 11. 13. 15. 17.]
          third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]]
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: [ [ 3. 8. 14. 20. 23.5 26.5 1.5 4.5 1.5 3. 2.5 3.5 4.5 3.5
113
114
          second level: [ 0. 2. 1. 5. 3. 2. 2. 1. 4. 6. 7. 9.11.13.15.17.] third level: [5. 2. 8. 4. 2. 7. 2. 9. 2. 3. 5. 2. 6. 3. 2. 3.]
115
116
117
        Objective function values and some other indicators:
                                 Obj1 = 130.00
          Obi0 = 19.00
                                                           Obj0 + Obj1 = 149.00
118
119
          Total movement of crane: 32.00
120
          Total waiting time in berth position: 98.00
121
          Total index of q during berthing: 502.00
122
        Specific arrangement for each vessel:
123
           V_id: 0
                               li: 6.0
                                                    xi: 3.0
                                                                        bow of i: 0.0
                                                                                                    tail of i: 6.0
                                                                                                                               gama_i0: 0.0
                                                                                                                                                           gama i1: 1.0
                     duration_time_i: 1.0
                                                         demand_i: 80.0
                                                                                        work load_i: 80.0
                                                                                                                         work load gap_i: 0
124
           V_id: 1
                               li: 4.0
                                                    xi: 8.0
                                                                        bow of i: 6.0
                                                                                                    tail of i: 10.0
                                                                                                                                 gama_i0: 2.0
                                                                                                                                                              gama_i1: 6.0
                     duration_time_i: 4.0
                                                         demand_i: 160.0
                                                                                        work load_i: 160.0
                                                                                                                         work load gap_i: 0
125
           V_id: 2
                               li: 8.0
                                                                           bow of i: 10.0
                                                                                                       tail of i: 18.0
                                                                                                                                   gama_i0: 1.0
                                                                                                                                                                gama_i1: 2
                       duration time i: 1.0
                                                                                                                            work load gap_i: 0
     .0
                                                           demand i: 60.0
                                                                                          work load i: 60.0
126
           V_id: 3
                               li: 4.0
                                                   xi: 20.0
                                                                           bow of i: 18.0
                                                                                                       tail of i: 22.0
                                                                                                                                    gama_i0: 5.0
                                                                                                                                                                gama i1: 7
     .0
                       duration time i: 2.0
                                                           demand i: 160.0
                                                                                          work load i: 160.0
                                                                                                                            work load gap i: 0
127
           V_id: 4
                               1i: 3.0
                                                                           bow of i: 22.0
                                                                                                       tail of i: 25.0
                                                                                                                                   gama_i0: 3.0
                                                                                                                                                                gama_i1: 6
                                                                                                                            work load gap_i: 0
     .0
                       duration_time_i: 3.0
                                                           demand i: 100.0
                                                                                          work load i: 100.0
128
           V_id: 5
                               1i: 7.0
                                                    xi: 26.5
                                                                           bow of i: 23.0
                                                                                                       tail of i: 30.0
                                                                                                                                    gama_i0: 2.0
                                                                                                                                                                gama_i1: 3
                       duration_time_i: 1.0
                                                           demand_i: 80.0
                                                                                          work load i: 80.0
                                                                                                                            work load gap_i: 0
     .0
129
           V id: 6
                                                    xi: 1.5
                                                                        bow of i: 0.0
                                                                                                    tail of i: 3.0
                                                                                                                              gama i0: 2.0
                                                                                                                                                           gama i1: 4.0
                               li: 3.0
                     duration time i: 2.0
                                                         demand i: 60.0
                                                                                        work load i: 60.0
                                                                                                                         work load gap i: 0
130
           V_id: 7
                               li: 9.0
                                                    xi: 4.5
                                                                        bow of i: 0.0
                                                                                                    tail of i: 9.0
                                                                                                                               gama_i0: 1.0
                                                                                                                                                           gama_i1: 2.0
                                                         demand_i: 140.0
                     duration_time_i: 1.0
                                                                                        work load_i: 140.0
                                                                                                                         work load gap_i: 0
131
          V_id: 8
                                                                        bow of i: 0.0
                                                                                                    tail of i: 3.0
                                                                                                                              gama i0: 4.0
                               li: 3.0
                                                    xi: 1.5
                                                                                                                                                           gama i1: 6.0
                                                         demand_i: 80.0
                     duration_time_i: 2.0
                                                                                        work load i: 80.0
                                                                                                                         work load gap_i: 0
132
           V id: 9
                                                    xi: 3.0
                                                                        bow of i: 0.0
                                                                                                    tail of i: 6.0
                                                                                                                               gama i0: 6.0
                               li: 6.0
                                                                                                                                                           gama_i1: 7.0
                                                        demand i: 60.0
                     duration time i: 1.0
                                                                                        work load i: 60.0
                                                                                                                         work load gap i: 0
133
          V_id: 10
                                                                           bow of i: 0.0
                                                                                                                                 gama_i0: 7.0
                                 li: 5.0
                                                      xi: 2.5
                                                                                                       tail of i: 5.0
                                                                                                                                                             gama i1: 9.0
                     duration_time_i: 2.0
                                                         demand_i: 120.0
                                                                                        work load_i: 120.0
                                                                                                                         work load gap_i: 0
          V_id: 11
                                                                           bow of i: 0.0
                                                                                                                                 gama_i0: 9.0
134
                                 li: 7.0
                                                       xi: 3.5
                                                                                                       tail of i: 7.0
                                                                                                                                                              gama_i1: 11.
     0
                                                        demand i: 80.0
                                                                                                                         work load gap i: 0
                    duration time i: 2.0
                                                                                        work load i: 80.0
135
           V_id: 12
                                                                                                       tail of i: 9.0
                                 li: 9.0
                                                      xi: 4.5
                                                                           bow of i: 0.0
                                                                                                                                 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
           V_id: 13
136
                                                                           bow of i: 0.0
                                 li: 7.0
                                                      xi: 3.5
                                                                                                       tail of i: 7.0
                                                                                                                                 gama_i0: 13.0
                                                                                                                                                              gama_i1: 15.
     0
                     duration_time_i: 2.0
                                                        demand_i: 80.0
                                                                                        work load_i: 80.0
                                                                                                                         work load gap i: 0
137
           V_id: 14
                                 li: 7.0
                                                      xi: 3.5
                                                                           bow of i: 0.0
                                                                                                       tail of i: 7.0
                                                                                                                                 gama_i0: 15.0
                                                                                                                                                              gama_i1: 17.
     0
                                                        demand_i: 80.0
                                                                                                                         work load gap_i: 0
                     duration_time_i: 2.0
                                                                                        work load_i: 80.0
                                                      xi: 2.0
138
           V id: 15
                                 li: 4.0
                                                                           bow of i: 0.0
                                                                                                       tail of i: 4.0
                                                                                                                                 gama i0: 17.0
                                                                                                                                                              gama i1: 20.
                     duration_time_i: 3.0
                                                        demand i: 140.0
                                                                                       work load_i: 140.0
                                                                                                                         work load gap_i: 0
     0
139
140 Algorithm finished and the total CPU time: 1307 s
141 End
142
```