```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=50681
 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_17_2 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] = 75.20 temp_best_value_gen = 75.20
36
         The No. 0 iteration is finished!
37
38
39 Beging the No. 1 iteration:
         obj[gen-1] = 75.20 temp_best_value_gen = 75.20
40
         No, maintain solution and obj[gen] = 75.20, and the tolerance_counter = 1
41
42
         solution chromosome =
43
             first level: [ [7.56 6.05 1.56 5.06 7.63 3.82 8.66 3.79 4.55 3.29 3.75 1.84 4.89 7.64
44
       1.57 7.27 1.58]
45
             second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
46
             third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
47
         The No. 1 iteration is finished!
48
49
     Beging the No. 2 iteration:
50
         obj[gen-1] = 75.20 temp_best_value_gen = 75.20
51
         No, maintain solution and obj[gen] = 75.20, and the tolerance_counter = 2
52
         solution chromosome =
             first level: [ [7.56 6.05 1.56 5.06 7.63 3.82 8.66 3.79 4.55 3.29 3.75 1.84 4.89 7.64
53
54
       1.57 7.27 1.58]
55
             second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
56
             third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
57
         The No. 2 iteration is finished!
58
59 Beging the No. 3 iteration:
         obj[gen-1] = 75.20 temp_best_value_gen = 75.20
60
         No, maintain solution and obj[gen] = 75.20, and the tolerance_counter = 3
61
62
         solution chromosome =
             first level: [ [7.56 6.05 1.56 5.06 7.63 3.82 8.66 3.79 4.55 3.29 3.75 1.84 4.89 7.64
63
64
      1.57 7.27 1.58]
             second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
65
             third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
66
         The No. 3 iteration is finished!
67
68
69 Beging the No. 4 iteration:
         obj[gen-1] = 75.20 temp_best_value_gen = 75.20
70
71
         No, maintain solution and obj[gen] = 75.20, and the tolerance counter = 4
         solution chromosome
73
             first level: [ [7.56 6.05 1.56 5.06 7.63 3.82 8.66 3.79 4.55 3.29 3.75 1.84 4.89 7.64
74
75
             second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
             third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
76
         The No. 4 iteration is finished!
77
78
     Beging the No. 5 iteration:
79
```

```
obj[gen-1] = 75.20 temp_best_value_gen = 75.20
 80
       No, maintain solution and obj[gen] = 75.20, and the tolerance_counter = 5
 81
       solution chromosome =
 82
          first level: [ [7.56\ 6.05\ 1.56\ 5.06\ 7.63\ 3.82\ 8.66\ 3.79\ 4.55\ 3.29\ 3.75\ 1.84\ 4.89\ 7.64
 83
      1.57 7.27 1.58]
 85
          second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
          third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
 86
 87
       The No. 5 iteration is finished!
 88
 89
     Beging the No. 6 iteration:
       obj[gen-1] = 75.20 temp_best_value_gen = 75.20
 90
 91
        No, maintain solution and obj[gen] = 75.20, and the tolerance_counter = 6
 92
       solution chromosome =
 93
          first level: [ [7.56 6.05 1.56 5.06 7.63 3.82 8.66 3.79 4.55 3.29 3.75 1.84 4.89 7.64
 94
      1.57 7.27 1.581
 95
          second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
 96
          third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
 97
        The No. 6 iteration is finished!
 98
 99
100
101
    The iteration is terminated and then visulize the solution:
102
        solution chromosome =
          first level: [ [7.56 6.05 1.56 5.06 7.63 3.82 8.66 3.79 4.55 3.29 3.75 1.84 4.89 7.64
103
104
      1.57 7.27 1.58]
105
          second level: [13. 0. 4. 2. 6. 1. 3. 9. 7. 21. 24. 26. 15. 4. 3. 16. 13.]
          third level: [4. 5. 2. 4. 6. 5. 6. 2. 4. 3. 7. 1. 6. 3. 3. 2. 3.]]
106
        Objective function values and some other indicators:
107
                                 Obj1 = 220.00
                                                          Obj0 + Obj1 = 248.00
108
          Obi0 = 28.00
109
          Total movement of crane: 53.00
110
          Total waiting time in berth position: 167.00
111
          Total index of q during berthing: 256.00
112
        Specific arrangement for each vessel:
                                                                                                   tail of i: 9.6
                                                                                                                             gama_i0: 13.0
113
           V_id: 0
                              li: 4.0
                                                   xi: 7.6
                                                                       bow of i: 5.6
                                                                                                                                                         gama_i1: 15.0
                    duration_time_i: 2.0
                                                        demand i: 160.0
                                                                                       work load i: 160.0
                                                                                                                        work load gap i: 0
114
           V_id: 1
                              1i: 9.0
                                                                       bow of i: 1.6
                                                   xi: 6.1
                                                                                                   tail of i: 10.6
                                                                                                                               gama_i0: 0.0
                                                                                                                                                            gama_i1: 1.0
                    duration_time_i: 1.0
                                                        demand i: 60.0
                                                                                       work load i: 60.0
                                                                                                                        work load gap_i: 0
          V id: 2
115
                                                   xi: 1.6
                                                                       bow of i: 0.1
                                                                                                   tail of i: 3.1
                                                                                                                            gama i0: 4.0
                                                                                                                                                         gama i1: 7.0
                              li: 3.0
                                                                                                                        work load gap_i: 0
                     duration_time_i: 3.0
                                                        demand i: 120.0
                                                                                       work load i: 120.0
116
          V_id: 3
                              li: 6.0
                                                   xi: 5.1
                                                                       bow of i: 2.1
                                                                                                   tail of i: 8.1
                                                                                                                             gama_i0: 2.0
                                                                                                                                                         gama_i1: 3.0
                                                        demand i: 80.0
                                                                                                                        work load gap_i: 0
                     duration_time_i: 1.0
                                                                                       work load_i: 80.0
117
          V id: 4
                                                                       bow of i: 3.6
                                                                                                   tail of i: 11.6
                                                                                                                               gama i0: 6.0
                              li: 8.0
                                                   xi: 7.6
                                                                                                                                                           gama i1: 7.0
                                                                                                                        work load gap_i: 0
                     duration_time_i: 1.0
                                                        demand i: 120.0
                                                                                       work load i: 120.0
118
          V id: 5
                              li: 7.0
                                                   xi: 3.8
                                                                       bow of i: 0.3
                                                                                                   tail of i: 7.3
                                                                                                                             gama_i0: 1.0
                                                                                                                                                         gama i1: 2.0
                    duration_time_i: 1.0
                                                        demand_i: 100.0
                                                                                       work load_i: 100.0
                                                                                                                        work load gap_i: 0
119
          V_id: 6
                                                                                                                               gama_i0: 3.0
                              li: 9.0
                                                   xi: 8.7
                                                                       bow of i: 4.2
                                                                                                   tail of i: 13.2
                                                                                                                                                           gama_i1: 4.0
                                                        demand_i: 100.0
                     duration_time_i: 1.0
                                                                                       work load_i: 100.0
                                                                                                                        work load gap_i: 0
                                                                       bow of i: 1.8
                                                                                                   tail of i: 5.8
                                                                                                                                                         gama_i1: 13.0
120
          V_id: 7
                              li: 4.0
                                                   xi: 3.8
                                                                                                                            gama_i0: 9.0
                                                        demand i: 160.0
                                                                                       work load i: 160.0
                                                                                                                        work load gap_i: 0
                     duration time i: 4.0
          V_id: 8
121
                              li: 9.0
                                                   xi: 4.5
                                                                       bow of i: 0.0
                                                                                                   tail of i: 9.0
                                                                                                                             gama i0: 7.0
                                                                                                                                                         gama_i1: 9.0
                     duration time i: 2.0
                                                        demand i: 100.0
                                                                                       work load i: 100.0
                                                                                                                        work load gap i: 0
122
           V_id: 9
                              li: 4.0
                                                   xi: 3.3
                                                                       bow of i: 1.3
                                                                                                   tail of i: 5.3
                                                                                                                            gama_i0: 21.0
                                                                                                                                                         gama_i1: 24.0
                                                        demand i: 160.0
                    duration_time_i: 3.0
                                                                                       work load i: 160.0
                                                                                                                        work load gap_i: 0
123
           V_id: 10
                                 li: 7.0
                                                      xi: 3.8
                                                                          bow of i: 0.3
                                                                                                      tail of i: 7.3
                                                                                                                               gama_i0: 24.0
                                                                                                                                                            gama_i1: 26.
     0
                                                        demand_i: 160.0
                                                                                       work load i: 160.0
                                                                                                                        work load gap_i: 0
                     duration_time_i: 2.0
124
           V id: 11
                                                      xi: 1.8
                                                                          bow of i: 0.3
                                                                                                      tail of i: 3.3
                                                                                                                               gama i0: 26.0
                                 li: 3.0
                                                                                                                                                           gama i1: 29.
     0
                    duration_time_i: 3.0
                                                        demand i: 60.0
                                                                                       work load i: 60.0
                                                                                                                        work load gap_i: 0
125
           V id: 12
                                 li: 7.0
                                                      xi: 4.9
                                                                          bow of i: 1.4
                                                                                                      tail of i: 8.4
                                                                                                                               gama_i0: 15.0
                                                                                                                                                            gama_i1: 16.
     0
                    duration_time_i: 1.0
                                                        demand_i: 60.0
                                                                                       work load_i: 60.0
                                                                                                                        work load gap_i: 0
                                                                                                                                 gama_i0: 4.0
126
           V id: 13
                                 1i: 9.0
                                                                          bow of i: 3.1
                                                                                                      tail of i: 12.1
                                                                                                                                                              gama_i1: 6
                                                      xi: 7.6
     .0
                       duration time i: 2.0
                                                          demand i: 80.0
                                                                                         work load_i: 80.0
                                                                                                                          work load gap_i: 0
127
           V id: 14
                                 li: 3.0
                                                      xi: 1.6
                                                                          bow of i: 0.1
                                                                                                      tail of i: 3.1
                                                                                                                               gama i0: 3.0
                                                                                                                                                            gama i1: 4.0
                                                        demand i: 60.0
                    duration time i: 1.0
                                                                                       work load i: 60.0
                                                                                                                        work load gap i: 0
128
          V_id: 15
                                 1i: 8.0
                                                                          bow of i: 3.3
                                                                                                      tail of i: 11.3
                                                                                                                                  gama_i0: 16.0
                                                                                                                                                              gama_i1:
                                                      xi: 7.3
     20.0
                         duration_time_i: 4.0
                                                             demand_i: 140.0
                                                                                            work load_i: 140.0
                                                                                                                             work load gap_i: 0
129
                                                      xi: 1.6
                                                                                                      tail of i: 3.1
                                                                                                                               gama_i0: 13.0
                                 li: 3.0
                                                                          bow of i: 0.1
                                                                                                                                                            gama_i1: 15.
                                                        demand i: 120.0
                    duration time i: 2.0
                                                                                      work load i: 120.0
                                                                                                                        work load gap_i: 0
130
131
    Algorithm finished and the total CPU time: 1379 s
132 End
133
```