```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=52414
 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_7 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] = 81.40 temp_best_value_gen = 81.40
36
         The No. 0 iteration is finished!
37
38
39 Beging the No. 1 iteration:
         obj[gen-1] = 81.40 temp_best_value_gen = 73.40
40
         Yes, update solution and obj[gen] = 73.40
41
42
         solution chromosome =
43
             first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
44
       13. 3.5 2.5]
45
             second level: [4. 3. 23. 6. 11. 15. 8. 10. 14. 1. 0. 18. 19. 22. 2. 25. 27.]
46
             third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
47
         The No. 1 iteration is finished!
48
     Beging the No. 2 iteration:
49
50
         obj[gen-1] = 73.40 temp_best_value_gen = 73.40
51
         No, maintain solution and obj[gen] = 73.40, and the tolerance_counter = 1
52
         solution chromosome =
53
             first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
54
       13. 3.5 2.5]
55
             second level: [4, 3, 23, 6, 11, 15, 8, 10, 14, 1, 0, 18, 19, 22, 2, 25, 27,]
             third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
56
57
         The No. 2 iteration is finished!
58
59 Beging the No. 3 iteration:
         obj[gen-1] = 73.40 temp_best_value_gen = 73.40
60
         No, maintain solution and obj[gen] = 73.40, and the tolerance_counter = 2
61
62
         solution chromosome =
             first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
63
64
      13. 3.5 2.51
             second level: [4. 3. 23. 6. 11. 15. 8. 10. 14. 1. 0. 18. 19. 22. 2. 25. 27.]
65
             third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
66
67
         The No. 3 iteration is finished!
68
69 Beging the No. 4 iteration:
         obj[gen-1] = 73.40 temp_best_value_gen = 73.40
70
71
         No, maintain solution and obj[gen] = 73.40, and the tolerance_counter = 3
         solution chromosome =
73
             first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
74
75
             second level: [4. 3. 23. 6. 11. 15. 8. 10. 14. 1. 0. 18. 19. 22. 2. 25. 27.]
             third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
76
         The No. 4 iteration is finished!
77
78
     Beging the No. 5 iteration:
79
```

```
obj[gen-1] = 73.40 temp_best_value_gen = 73.40
 80
 81
       No, maintain solution and obj[gen] = 73.40, and the tolerance_counter = 4
 82
       solution chromosome =
 83
          first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
      13. 3.5 2.51
 85
          second level: [4. 3. 23. 6. 11. 15. 8. 10. 14. 1. 0. 18. 19. 22. 2. 25. 27.]
          third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
 86
 87
       The No. 5 iteration is finished!
 88
 89
     Beging the No. 6 iteration:
 90
       obj[gen-1] = 73.40 temp_best_value_gen = 73.40
 91
        No, maintain solution and obj[gen] = 73.40, and the tolerance_counter = 5
       solution chromosome =
 93
          first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
 94
      13. 3.5 2.5]
 95
          second level: [4. 3. 23. 6. 11. 15. 8. 10. 14. 1. 0. 18. 19. 22. 2. 25. 27.]
          third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
 96
 97
       The No. 6 iteration is finished!
 98
 99
     Beging the No. 7 iteration:
100
       obj[gen-1] = 73.40 temp_best_value_gen = 73.40
101
        No, maintain solution and obj[gen] = 73.40, and the tolerance_counter = 6
102
        solution chromosome =
          first level: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
103
104
      13. 3.5 2.5]
105
          second level: [4. 3. 23. 6. 11. 15. 8. 10. 14. 1. 0. 18. 19. 22. 2. 25. 27.]
          third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
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: [ [ 1.5 6. 4. 20.5 25.5 4. 1.5 2. 4.5 1.5 3. 3.5 3. 4.5
113
114
      13. 3.5 2.51
          second level: [4, 3, 23, 6, 11, 15, 8, 10, 14, 1, 0, 18, 19, 22, 2, 25, 27,]
115
          third level: [2. 4. 4. 5. 2. 2. 2. 1. 9. 2. 5. 5. 3. 6. 5. 4. 5.]]
116
117
        Objective function values and some other indicators:
                                Obj1 = 221.00
          Obi0 = 27.00
                                                          Obj0 + Obj1 = 248.00
118
119
          Total movement of crane: 13.00
120
          Total waiting time in berth position: 208.00
121
          Total index of q during berthing: 468.00
122
        Specific arrangement for each vessel:
123
          V_id: 0
                              li: 3.0
                                                  xi: 1.5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 3.0
                                                                                                                           gama i0: 4.0
                                                                                                                                                       gama i1: 8.0
                    duration_time_i: 4.0
                                                       demand_i: 160.0
                                                                                     work load_i: 160.0
                                                                                                                      work load gap_i: 0
124
          V_id: 1
                              li: 6.0
                                                  xi: 6.0
                                                                      bow of i: 3.0
                                                                                                  tail of i: 9.0
                                                                                                                           gama i0: 3.0
                                                                                                                                                       gama_i1: 5.0
                    duration_time_i: 2.0
                                                       demand_i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                      work load gap_i: 0
                                                                                                                                                       gama_i1: 25.0
125
          V id: 2
                              li: 8.0
                                                  xi: 4.0
                                                                      bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama_i0: 23.0
                    duration time i: 2.0
                                                                                      work load i: 100.0
                                                       demand i: 100.0
                                                                                                                      work load gap i: 0
                                                                                                                                gama_i0: 6.0
126
          V id: 3
                              1i: 7.0
                                                  xi: 20.5
                                                                         bow of i: 17.0
                                                                                                    tail of i: 24.0
                                                                                                                                                            gama i1: 8
     .0
                       duration time i: 2.0
                                                          demand i: 140.0
                                                                                        work load i: 140.0
                                                                                                                         work load gap i: 0
127
                              1i: 9.0
          V_id: 4
                                                  xi: 25.5
                                                                         bow of i: 21.0
                                                                                                    tail of i: 30.0
                                                                                                                                gama_i0: 11.0
                                                                                                                                                            gama_i1:
                                                                                          work load i: 160.0
     15.0
                         duration time i: 4.0
                                                            demand_i: 160.0
                                                                                                                           work load gap_i: 0
                                                                                                                           gama_i0: 15.0
128
          V_id: 5
                              li: 8.0
                                                  xi: 4.0
                                                                      bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                                                       gama_i1: 17.0
                                                       demand_i: 80.0
                                                                                      work load i: 80.0
                                                                                                                      work load gap_i: 0
                    duration_time_i: 2.0
129
          V id: 6
                                                                      bow of i: 0.0
                                                                                                  tail of i: 3.0
                                                                                                                           gama i0: 8.0
                              li: 3.0
                                                  xi: 1.5
                                                                                                                                                       gama i1: 10.0
                                                       demand i: 60.0
                                                                                     work load i: 60.0
                                                                                                                      work load gap i: 0
                    duration time i: 2.0
130
          V_id: 7
                              li: 4.0
                                                  xi: 2.0
                                                                      bow of i: 0.0
                                                                                                  tail of i: 4.0
                                                                                                                           gama_i0: 10.0
                                                                                                                                                       gama_i1: 14.0
                                                       demand_i: 80.0
                    duration_time_i: 4.0
                                                                                      work load_i: 80.0
                                                                                                                      work load gap_i: 0
131
          V_id: 8
                              1i: 9.0
                                                                                                  tail of i: 9.0
                                                                                                                           gama i0: 14.0
                                                                                                                                                       gama_i1: 15.0
                                                  xi: 4.5
                                                                      bow of i: 0.0
                                                       demand_i: 100.0
                    duration_time_i: 1.0
                                                                                     work load_i: 100.0
                                                                                                                      work load gap_i: 0
132
          V id: 9
                                                                      bow of i: 0.0
                                                                                                  tail of i: 3.0
                                                                                                                           gama i0: 1.0
                              li: 3.0
                                                  xi: 1.5
                                                                                                                                                       gama i1: 4.0
                                                       demand i: 100.0
                    duration time i: 3.0
                                                                                     work load i: 100.0
                                                                                                                      work load gap i: 0
133
          V_id: 10
                                                                         bow of i: 0.0
                                                                                                                             gama_i0: 0.0
                                                     xi: 3.0
                                                                                                    tail of i: 6.0
                                                                                                                                                         gama i1: 1.0
                                li: 6.0
                    duration_time_i: 1.0
                                                       demand_i: 60.0
                                                                                      work load_i: 60.0
                                                                                                                      work load gap_i: 0
                                                                         bow of i: 0.0
134
                                li: 7.0
                                                     xi: 3.5
                                                                                                    tail of i: 7.0
                                                                                                                             gama_i0: 18.0
                                                                                                                                                          gama_i1: 19.
     0
                                                       demand i: 100.0
                                                                                                                      work load gap i: 0
                    duration time i: 1.0
                                                                                     work load i: 100.0
135
          V id: 12
                                                                                                                              gama_i0: 19.0
                                li: 6.0
                                                     xi: 3.0
                                                                         bow of i: 0.0
                                                                                                    tail of i: 6.0
                                                                                                                                                          gama_i1: 22.
     0
                    duration_time_i: 3.0
                                                       demand i: 140.0
                                                                                     work load i: 140.0
                                                                                                                      work load gap i: 0
136
          V id: 13
                                li: 9.0
                                                     xi: 4.5
                                                                         bow of i: 0.0
                                                                                                    tail of i: 9.0
                                                                                                                             gama_i0: 22.0
                                                                                                                                                          gama_i1: 23.
     0
                                                       demand_i: 120.0
                                                                                     work load_i: 120.0
                                                                                                                      work load gap_i: 0
                    duration time i: 1.0
137
          V_id: 14
                                li: 5.0
                                                     xi: 13.0
                                                                           bow of i: 10.5
                                                                                                       tail of i: 15.5
                                                                                                                                   gama_i0: 2.0
                                                                                                                                                              gama_i1
                         duration_time_i: 2.0
     : 4.0
                                                            demand i: 120.0
                                                                                          work load i: 120.0
                                                                                                                            work load gap_i: 0
138
          V id: 15
                                li: 7.0
                                                                         bow of i: 0.0
                                                                                                    tail of i: 7.0
                                                                                                                             gama i0: 25.0
                                                                                                                                                         gama i1: 27.
                                                       demand_i: 100.0
                                                                                     work load_i: 100.0
     0
                    duration_time_i: 2.0
                                                                                                                      work load gap_i: 0
                                                                         bow of i: 0.0
139
          V id: 16
                                li: 5.0
                                                     xi: 2.5
                                                                                                    tail of i: 5.0
                                                                                                                             gama i0: 27.0
                                                                                                                                                          gama i1: 28.
     0
                    duration_time_i: 1.0
                                                       demand_i: 80.0
                                                                                     work load_i: 80.0
                                                                                                                      work load gap_i: 0
140
141 Algorithm finished and the total CPU time: 1330 s
142
    End
143
```