```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=6755
 2
 3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   01_My_Python_Code', 'E:/1 0000/3 00000/1 000000/1 0000000/1_000000/1_000000/2 python code/
   01_My_Python_Code'])
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_19_9 standard_test.xlsx optimization process solved by ENSGA-II algorithm.
14
15
   Start
16
17
   Before iteration:
18
     Read basic data
19
     Parameter setting:
20
       trail = 58
21
       Pop_size = 30
       Tolerance iteration unchanged number = 10
23
       Chrom size = 57
24
       Iter_num_GA = 300
25
       Select_rate = 0.85
26
       Crossover rate = 0.95
       Mutation rate = 0.95
27
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] = 86.10 temp_best_value_gen = 86.10
36
     The No. 0 iteration is finished!
37
38
39 Beging the No. 1 iteration:
40
     obj[gen-1] = 86.10 temp_best_value_gen = 86.10
41
     No, maintain solution and obj[gen] = 86.10, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [ 1.5 7.5 16. 21.5 26. 3.5 2. 1.5 3.5 2.5 2.5 4.5 2. 3.
44
    1.5 4.5 4. 14. 9.]
45
       second level: [ 0. 2. 0. 3. 1. 4. 7. 11. 14. 16. 17. 19. 21. 23. 25. 28. 32. 3.
46
    4.]
47
       third level: [2. 4. 4. 2. 2. 2. 2. 3. 4. 5. 4. 4. 2. 5. 2. 2. 6. 2. 1.]]
48
     The No. 1 iteration is finished!
49
50
   Beging the No. 2 iteration:
51
     obj[gen-1] = 86.10 temp best value gen = 86.10
52
     No, maintain solution and obj[gen] = 86.10, and the tolerance counter = 2
53
     solution chromosome =
54
       first level: [ [ 1.5 7.5 16. 21.5 26. 3.5 2. 1.5 3.5 2.5 2.5 4.5 2. 3.
55
    1.5 4.5 4. 14. 9.]
56
       second level: [ 0. 2. 0. 3. 1. 4. 7. 11. 14. 16. 17. 19. 21. 23. 25. 28. 32. 3.
57
58
       third level: [2, 4, 4, 2, 2, 2, 2, 3, 4, 5, 4, 4, 2, 5, 2, 2, 6, 2, 1,]]
59
     The No. 2 iteration is finished!
60
   Beging the No. 3 iteration:
61
62
     obj[gen-1] = 86.10 temp best value gen = 86.10
63
     No, maintain solution and obj[gen] = 86.10, and the tolerance_counter = 3
64
     solution chromosome =
65
       first level: [ [ 1.5 7.5 16. 21.5 26. 3.5 2. 1.5 3.5 2.5 2.5 4.5 2. 3.
    1.5 4.5 4. 14. 9.]
66
67
       second level: [ 0. 2. 0. 3. 1. 4. 7. 11. 14. 16. 17. 19. 21. 23. 25. 28. 32. 3.
68
69
       third level: [2. 4. 4. 2. 2. 2. 2. 3. 4. 5. 4. 4. 2. 5. 2. 2. 6. 2. 1.]]
70
     The No. 3 iteration is finished!
71
   Beging the No. 4 iteration:
73
     obj[gen-1] = 86.10 temp_best_value_gen = 86.10
74
     No, maintain solution and obj[gen] = 86.10, and the tolerance_counter = 4
75
     solution chromosome =
76
       first level: [ [ 1.5 7.5 16. 21.5 26. 3.5 2. 1.5 3.5 2.5 2.5 4.5 2. 3.
    1.5 4.5 4. 14. 9.1
77
78
       second level: [0. 2. 0. 3. 1. 4. 7. 11. 14. 16. 17. 19. 21. 23. 25. 28. 32. 3.
79
```

```
80
          third level: [2. 4. 4. 2. 2. 2. 2. 3. 4. 5. 4. 4. 2. 5. 2. 2. 6. 2. 1.]]
 81
        The No. 4 iteration is finished!
 82
 83
 84
 85
     The iteration is terminated and then visulize the solution:
 86
        solution chromosome =
 87
          first level: [ [ 1.5 7.5 16. 21.5 26. 3.5 2. 1.5 3.5 2.5 2.5 4.5 2. 3.
 88
      1.5 4.5 4. 14. 9.]
 89
          second level: [ 0. 2. 0. 3. 1. 4. 7. 11. 14. 16. 17. 19. 21. 23. 25. 28. 32. 3.
 90
 91
          third level: [2. 4. 4. 2. 2. 2. 2. 3. 4. 5. 4. 4. 2. 5. 2. 2. 6. 2. 1.]]
 92
        Objective function values and some other indicators:
 93
          Obj0 = 33.00
                                                          Obj0 + Obj1 = 267.00
                                Obj1 = 234.00
 94
          Total movement of crane: 4.00
 95
          Total waiting time in berth position: 230.00
 96
          Total index of q during berthing: 468.00
 97
        Specific arrangement for each vessel:
 98
                              1i: 3.0
                                                   xi: 1.5
                                                                       bow of i: 0.0
                                                                                                   tail of i: 3.0
                                                                                                                            gama_i0: 0.0
                                                                                                                                                        gama_i1: 3.0
           V_id: 0
                    duration time i: 3.0
                                                       demand i: 120.0
                                                                                      work load i: 120.0
                                                                                                                       work load gap i: 0
 99
           V_id: 1
                                                                       bow of i: 3.0
                                                                                                                              gama_i0: 2.0
                              1i: 9.0
                                                   xi: 7.5
                                                                                                  tail of i: 12.0
                                                                                                                                                          gama_i1: 4.0
                                                                                      work load_i: 160.0
                     duration_time_i: 2.0
                                                        demand_i: 160.0
                                                                                                                       work load gap_i: 0
                                                                                                                                 gama_i0: 0.0
100
           V_id: 2
                                                                                                     tail of i: 20.0
                              li: 8.0
                                                   xi: 16.0
                                                                         bow of i: 12.0
                                                                                                                                                             gama_i1: 1
                                                                                                                          work load gap_i: 0
     .0
                       duration_time i: 1.0
                                                          demand_i: 80.0
                                                                                         work load i: 80.0
101
                                                                         bow of i: 20.0
           V_id: 3
                              li: 3.0
                                                   xi: 21.5
                                                                                                     tail of i: 23.0
                                                                                                                                 gama_i0: 3.0
                                                                                                                                                             gama i1:6
     .0
                       duration_time_i: 3.0
                                                          demand_i: 120.0
                                                                                         work load_i: 120.0
                                                                                                                          work load gap_i: 0
102
           V_id: 4
                                                                         bow of i: 22.0
                              li: 8.0
                                                                                                     tail of i: 30.0
                                                                                                                                gama i0: 1.0
                                                                                                                                                             gama i1:3
                                                          demand_i: 80.0
                                                                                                                         work load gap_i: 0
                                                                                         work load i: 80.0
     .0
                       duration_time_i: 2.0
103
                                                   xi: 3.5
           V_id: 5
                              li: 7.0
                                                                       bow of i: 0.0
                                                                                                   tail of i: 7.0
                                                                                                                            gama_i0: 4.0
                                                                                                                                                        gama_i1: 7.0
                    duration_time_i: 3.0
                                                        demand_i: 120.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
104
          V id: 6
                              li: 4.0
                                                   xi: 2.0
                                                                       bow of i: 0.0
                                                                                                   tail of i: 4.0
                                                                                                                            gama i0: 7.0
                                                                                                                                                        gama_i1: 11.0
                     duration_time_i: 4.0
                                                        demand i: 140.0
                                                                                      work load i: 140.0
                                                                                                                       work load gap i: 0
105
           V_id: 7
                              li: 3.0
                                                   xi: 1.5
                                                                       bow of i: 0.0
                                                                                                   tail of i: 3.0
                                                                                                                            gama_i0: 11.0
                                                                                                                                                        gama_i1: 14.0
                                                        demand_i: 140.0
                     duration_time_i: 3.0
                                                                                      work load_i: 140.0
                                                                                                                       work load gap_i: 0
                                                                                                                            gama i0: 14.0
106
          V_id: 8
                              li: 7.0
                                                   xi: 3.5
                                                                       bow of i: 0.0
                                                                                                  tail of i: 7.0
                                                                                                                                                        gama_i1: 16.0
                                                        demand_i: 160.0
                                                                                      work load_i: 160.0
                     duration_time_i: 2.0
                                                                                                                       work load gap_i: 0
                                                   xi: 2.5
107
           V id: 9
                              li: 5.0
                                                                       bow of i: 0.0
                                                                                                   tail of i: 5.0
                                                                                                                            gama_i0: 16.0
                                                                                                                                                        gama_i1: 17.0
                                                       demand i: 60.0
                                                                                      work load i: 60.0
                                                                                                                       work load gap i: 0
                     duration time i: 1.0
          V_id: 10
108
                                                                         bow of i: 0.0
                                                                                                     tail of i: 5.0
                                 li: 5.0
                                                     xi: 2.5
                                                                                                                              gama_i0: 17.0
                                                                                                                                                          gama_i1: 19.
     0
                    duration_time_i: 2.0
                                                        demand_i: 120.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
                                                                         bow of i: 0.0
                                                                                                                              gama_i0: 19.0
109
                                                                                                     tail of i: 9.0
                                 li: 9.0
                                                     xi: 4.5
                                                                                                                                                          gama_i1: 21.
     0
                                                       demand i: 120.0
                                                                                                                       work load gap_i: 0
                    duration time i: 2.0
                                                                                      work load i: 120.0
110
          V_id: 12
                                                                                                                              gama_i0: 21.0
                                                                         bow of i: 0.0
                                 1i: 4.0
                                                      xi: 2.0
                                                                                                     tail of i: 4.0
                                                                                                                                                          gama_i1: 23.
     0
                     duration_time_i: 2.0
                                                        demand_i: 60.0
                                                                                      work load i: 60.0
                                                                                                                       work load gap_i: 0
111
           V_id: 13
                                li: 6.0
                                                     xi: 3.0
                                                                         bow of i: 0.0
                                                                                                     tail of i: 6.0
                                                                                                                              gama_i0: 23.0
                                                                                                                                                          gama_i1: 25.
     0
                    duration_time_i: 2.0
                                                       demand i: 160.0
                                                                                      work load_i: 160.0
                                                                                                                       work load gap_i: 0
112
                                                                         bow of i: 0.0
           V_id: 14
                                 li: 3.0
                                                     xi: 1.5
                                                                                                     tail of i: 3.0
                                                                                                                              gama_i0: 25.0
                                                                                                                                                          gama_i1: 28.
     0
                    duration_time_i: 3.0
                                                       demand_i: 120.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
                                                                         bow of i: 0.0
113
           V id: 15
                                li: 9.0
                                                      xi: 4.5
                                                                                                     tail of i: 9.0
                                                                                                                              gama i0: 28.0
                                                                                                                                                          gama i1: 32.
                                                       demand_i: 140.0
                                                                                                                       work load gap_i: 0
     0
                    duration time i: 4.0
                                                                                      work load i: 140.0
114
           V id: 16
                                 li: 8.0
                                                     xi: 4.0
                                                                         bow of i: 0.0
                                                                                                     tail of i: 8.0
                                                                                                                              gama i0: 32.0
                                                                                                                                                          gama_i1: 34.
                    duration_time_i: 2.0
                                                        demand_i: 140.0
     0
                                                                                      work load_i: 140.0
                                                                                                                       work load gap_i: 0
          V_id: 17
115
                                                                            bow of i: 12.0
                                                                                                       tail of i: 16.0
                                li: 4.0
                                                     xi: 14.0
                                                                                                                                   gama i0: 3.0
                                                                                                                                                               gama_i1
                                                             demand_i: 100.0
     : 6.0
                         duration_time_i: 3.0
                                                                                           work load_i: 100.0
                                                                                                                            work load gap_i: 0
                                                      xi: 9.0
116
           V_id: 18
                                 li: 4.0
                                                                         bow of i: 7.0
                                                                                                     tail of i: 11.0
                                                                                                                                 gama_i0: 4.0
                                                                                                                                                             gama_i1: 8
                                                          demand i: 80.0
     .0
                       duration time i: 4.0
                                                                                         work load i: 80.0
                                                                                                                         work load gap_i: 0
117
     Algorithm finished and the total CPU time: 1252 s
118
119
120
```