```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=45246
 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 0000/1 LW 00002/6 0000/2 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_13_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 = 39
       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] = 58.00 temp_best_value_gen = 58.00
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 58.00 temp_best_value_gen = 58.00
40
     No, maintain solution and obj[gen] = 58.00, and the tolerance_counter = 1
41
42
     solution chromosome =
43
        first level: [ [ 4. 12. 20. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 3. ]
        second level: [7. 3. 0. 4. 8. 10. 14. 2. 16. 3. 19. 5. 8.]
44
45
       third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 58.00 temp_best_value_gen = 58.00
49
50
     No, maintain solution and obj[gen] = 58.00, and the tolerance_counter = 2
51
     solution chromosome =
        first level: [ [ 4. 12. 20. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 3. ]
52
53
        second level: [7. 3. 0. 4. 8. 10. 14. 2. 16. 3. 19. 5. 8.]
54
       third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 58.00 temp best value gen = 58.00
59
     No, maintain solution and obj[gen] = 58.00, and the tolerance_counter = 3
60
     solution chromosome =
        first level: [ [ 4. 12. 20. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 3. ]
61
       second level: [7. 3. 0. 4. 8. 10. 14. 2. 16. 3. 19. 5. 8.] third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]]
62
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 58.00 temp_best_value_gen = 58.00
68
     No, maintain solution and obj[gen] = 58.00, and the tolerance_counter = 4
69
     solution chromosome =
70
        first level: [[4. 12. 20. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 3.]
        second level: [7. 3. 0. 4. 8. 10. 14. 2. 16. 3. 19. 5. 8.]
71
        third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 58.00 temp best value gen = 53.90
76
     Yes, update solution and obj[gen] = 53.90
77
78
     solution chromosome =
        first level: [[4. 12. 4. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 20.]
79
```

```
80
          second level: [7. 3. 8. 4. 8. 10. 14. 2. 16. 3. 19. 5. 0.]
 81
          third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 53.90 temp best value gen = 53.90
       No, maintain solution and obj[gen] = 53.90, and the tolerance_counter = 1
 86
 87
        solution chromosome =
 88
          first level: [ [ 4. 12. 4. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 20. ]
          second level: [7. 3. 8. 4. 8. 10. 14. 2. 16. 3. 19. 5. 0.]
 89
 90
          third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]]
 91
        The No. 6 iteration is finished!
 92
 93
     Beging the No. 7 iteration:
 94
        obj[gen-1] = 53.90 temp_best_value_gen = 53.90
 95
        No, maintain solution and obj[gen] = 53.90, and the tolerance_counter = 2
 96
       solution chromosome =
 97
          first level: [ [ 4. 12. 4. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 20. ]
 98
          second level: [7. 3. 8. 4. 8. 10. 14. 2. 16. 3. 19. 5. 0.]
99
          third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]
100
        The No. 7 iteration is finished!
101
102
103
104
    The iteration is terminated and then visulize the solution:
105
       solution chromosome =
106
          first level: [ [ 4. 12. 4. 26.5 28. 3. 3.5 2. 4. 3. 3. 3. 20. ]
          second level: [7. 3. 8. 4. 8. 10. 14. 2. 16. 3. 19. 5. 0.]
107
          third level: [8. 7. 5. 3. 2. 2. 4. 4. 4. 2. 5. 2. 5.]]
108
109
        Objective function values and some other indicators:
110
          Obi0 = 20.00
                               Obil = 159.00
                                                         Obj0 + Obj1 = 179.00
          Total movement of crane: 31.00
111
112
          Total waiting time in berth position: 99.00
          Total index of q during berthing: 539.00
113
114
        Specific arrangement for each vessel:
                                                                      bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama_i0: 7.0
115
          V_id: 0
                              1i: 8.0
                                                  xi: 4.0
                                                                                                                                                       gama_i1: 8.0
                    duration_time_i: 1.0
                                                       demand_i: 160.0
                                                                                     work load i: 160.0
                                                                                                                      work load gap_i: 0
          V_id: 1
                                                                         bow of i: 8.0
116
                              li: 8.0
                                                                                                    tail of i: 16.0
                                                                                                                               gama i0: 3.0
                                                                                                                                                           gama_i1: 4
                                                  xi: 12.0
                                                                                        work load i: 140.0
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 1.0
                                                          demand i: 140.0
117
          V_id: 2
                              li: 8.0
                                                  xi: 4.0
                                                                      bow of i: 0.0
                                                                                                  tail of i: 8.0
                                                                                                                           gama_i0: 8.0
                                                                                                                                                       gama_i1: 10.0
                    duration_time_i: 2.0
                                                                                     work load_i: 120.0
                                                                                                                      work load gap_i: 0
                                                       demand_i: 120.0
118
          V_id: 3
                              li: 5.0
                                                                         bow of i: 24.0
                                                                                                                               gama i0: 4.0
                                                  xi: 26.5
                                                                                                    tail of i: 29.0
                                                                                                                                                           gama i1:7
                                                                                        work load_i: 140.0
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 3.0
                                                          demand i: 140.0
119
          V_id: 4
                              li: 4.0
                                                  xi: 28.0
                                                                         bow of i: 26.0
                                                                                                    tail of i: 30.0
                                                                                                                               gama_i0: 8.0
                                                                                                                                                            gama_i1:
     10.0
                         duration_time_i: 2.0
                                                            demand_i: 80.0
                                                                                          work load_i: 80.0
                                                                                                                           work load gap_i: 0
120
                                                                      bow of i: 0.0
                                                                                                                           gama_i0: 10.0
          V_id: 5
                              li: 6.0
                                                  xi: 3.0
                                                                                                  tail of i: 6.0
                                                                                                                                                       gama_i1: 14.0
                    duration_time_i: 4.0
                                                       demand_i: 160.0
                                                                                     work load_i: 160.0
                                                                                                                      work load gap_i: 0
                                                                                                  tail of i: 7.0
121
          V_id: 6
                              li: 7.0
                                                  xi: 3.5
                                                                      bow of i: 0.0
                                                                                                                           gama_i0: 14.0
                                                                                                                                                       gama_i1: 16.0
                    duration time i: 2.0
                                                       demand i: 120.0
                                                                                     work load i: 120.0
                                                                                                                      work load gap_i: 0
          V_id: 7
122
                              li: 4.0
                                                  xi: 2.0
                                                                      bow of i: 0.0
                                                                                                  tail of i: 4.0
                                                                                                                           gama i0: 2.0
                                                                                                                                                       gama_i1: 3.0
                    duration time i: 1.0
                                                       demand i: 80.0
                                                                                     work load i: 80.0
                                                                                                                      work load gap i: 0
123
          V_id: 8
                              1i: 8.0
                                                  xi: 4.0
                                                                      bow of i: 0.0
                                                                                                 tail of i: 8.0
                                                                                                                           gama_i0: 16.0
                                                                                                                                                       gama_i1: 18.0
                                                       demand i: 140.0
                    duration_time_i: 2.0
                                                                                     work load_i: 140.0
                                                                                                                      work load gap_i: 0
          V_id: 9
124
                                                                      bow of i: 0.0
                              li: 6.0
                                                  xi: 3.0
                                                                                                  tail of i: 6.0
                                                                                                                           gama_i0: 3.0
                                                                                                                                                       gama_i1: 5.0
                    duration_time_i: 2.0
                                                       demand_i: 60.0
                                                                                     work load_i: 60.0
                                                                                                                      work load gap_i: 0
125
          V id: 10
                                li: 6.0
                                                     xi: 3.0
                                                                         bow of i: 0.0
                                                                                                    tail of i: 6.0
                                                                                                                             gama i0: 19.0
                                                                                                                                                         gama i1: 21.
     0
                    duration_time_i: 2.0
                                                       demand i: 160.0
                                                                                     work load i: 160.0
                                                                                                                      work load gap_i: 0
126
          V_id: 11
                                                     xi: 3.0
                                                                         bow of i: 0.0
                                li: 6.0
                                                                                                    tail of i: 6.0
                                                                                                                             gama_i0: 5.0
                                                                                                                                                         gama_i1: 7.0
                    duration_time_i: 2.0
                                                       demand_i: 60.0
                                                                                     work load_i: 60.0
                                                                                                                      work load gap_i: 0
          V_id: 12
                                                                                                                                  gama_i0: 0.0
127
                                                                           bow of i: 17.5
                                li: 5.0
                                                     xi: 20.0
                                                                                                      tail of i: 22.5
                                                                                                                                                              gama_i1
     : 2.0
                         duration\_time\_i{:}~2.0
                                                            demand_i: 160.0
                                                                                          work load_i: 160.0
                                                                                                                           work load gap_i: 0
128
    Algorithm finished and the total CPU time: 1297 s
129
130 End
131
```