```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=55586
 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'])
 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_18_10 _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 = 54
       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] = 92.65 temp_best_value_gen = 92.65
36
     The No. 0 iteration is finished!
37
38
39 Beging the No. 1 iteration:
     obj[gen-1] = 92.65 temp_best_value_gen = 91.25
40
41
     Yes, update solution and obj[gen] = 91.25
42
     solution chromosome =
43
       first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
    3.8 4.99 3.81 12.5 4.33 11. ]
44
       second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
45
46
       third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
47
     The No. 1 iteration is finished!
48
   Beging the No. 2 iteration:
49
50
     obj[gen-1] = 91.25 temp_best_value_gen = 91.25
51
     No, maintain solution and obj[gen] = 91.25, and the tolerance_counter = 1
52
     solution chromosome =
       first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
53
54
    3.8 4.99 3.81 12.5 4.33 11. ]
       second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
55
       third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
56
57
     The No. 2 iteration is finished!
58
59 Beging the No. 3 iteration:
     obj[gen-1] = 91.25 temp_best_value_gen = 91.25
60
     No, maintain solution and obj[gen] = 91.25, and the tolerance_counter = 2
61
62
     solution chromosome =
63
       first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
    3.8 4.99 3.81 12.5 4.33 11. ]
64
       second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
65
       third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
66
67
     The No. 3 iteration is finished!
68
69 Beging the No. 4 iteration:
     obj[gen-1] = 91.25 temp_best_value_gen = 91.25
70
71
     No, maintain solution and obj[gen] = 91.25, and the tolerance counter = 3
     solution chromosome
       first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
73
    3.8 4.99 3.81 12.5 4.33 11. ]
74
       second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
75
       third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
76
     The No. 4 iteration is finished!
77
78
   Beging the No. 5 iteration:
79
```

```
obj[gen-1] = 91.25 temp_best_value_gen = 91.25
 81
       No, maintain solution and obj[gen] = 91.25, and the tolerance counter = 4
 82
       solution chromosome =
          first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
 83
      3.8 4.99 3.81 12.5 4.33 11.
          second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
 85
 86
          third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
 87
       The No. 5 iteration is finished!
 88
 89
     Beging the No. 6 iteration:
       obj[gen-1] = 91.25 temp_best_value_gen = 91.25
 90
 91
        No, maintain solution and obj[gen] = 91.25, and the tolerance_counter = 5
 92
       solution chromosome =
 93
          first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
 94
      3.8 4.99 3.81 12.5 4.33 11. ]
 95
          second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
 96
          third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
 97
        The No. 6 iteration is finished!
 98
 99
100
101
    The iteration is terminated and then visulize the solution:
102
        solution chromosome =
103
          first level: [ [ 4.84 4.99 2.23 2.59 5.59 3.06 1.84 4.67 6.64 4.48 4.51 6.45
      3.8 4.99 3.81 12.5 4.33 11. ]
104
105
          second level: [ 6. 23. 1. 2. 9. 13. 9. 15. 17. 18. 20. 25. 5. 27. 30. 4. 8. 1.]
          third level: [5. 3. 3. 2. 2. 4. 3. 5. 4. 4. 5. 5. 4. 2. 2. 2. 6. 2.]]
106
107
        Objective function values and some other indicators:
                                Obj1 = 285.48
                                                          Obj0 + Obj1 = 318.48
108
          Obi0 = 33.00
109
          Total movement of crane: 52.48
110
          Total waiting time in berth position: 233.00
111
          Total index of q during berthing: 295.00
112
        Specific arrangement for each vessel:
113
          V_id: 0
                              li: 9.0
                                                  xi: 4.8
                                                                       bow of i: 0.3
                                                                                                  tail of i: 9.3
                                                                                                                            gama_i0: 6.0
                                                                                                                                                        gama_i1: 8.0
                    duration_time_i: 2.0
                                                       demand i: 120.0
                                                                                      work load i: 120.0
                                                                                                                       work load gap i: 0
                                                                       bow of i: 0.5
114
          V_id: 1
                              1i: 9.0
                                                   xi: 5.0
                                                                                                  tail of i: 9.5
                                                                                                                            gama_i0: 23.0
                                                                                                                                                        gama_i1: 25.0
                    duration_time_i: 2.0
                                                        demand i: 100.0
                                                                                      work load i: 100.0
                                                                                                                       work load gap i: 0
          V id: 2
115
                              li: 3.0
                                                   xi: 2.2
                                                                       bow of i: 0.7
                                                                                                  tail of i: 3.7
                                                                                                                           gama i0: 1.0
                                                                                                                                                        gama i1: 2.0
                                                                                                                       work load gap_i: 0
                    duration_time_i: 1.0
                                                       demand_i: 60.0
                                                                                      work load i: 60.0
116
          V_id: 3
                              li: 4.0
                                                   xi: 2.6
                                                                       bow of i: 0.6
                                                                                                  tail of i: 4.6
                                                                                                                            gama_i0: 2.0
                                                                                                                                                        gama_i1: 5.0
                                                       demand i: 120.0
                    duration_time_i: 3.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
117
          V_id: 4
                                                                       bow of i: 4.1
                                                                                                                            gama i0: 9.0
                              li: 3.0
                                                   xi: 5.6
                                                                                                  tail of i: 7.1
                                                                                                                                                        gama i1: 13.0
                                                        demand_i: 140.0
                                                                                      work load_i: 140.0
                    duration_time_i: 4.0
                                                                                                                       work load gap i: 0
118
          V id: 5
                              li: 4.0
                                                   xi: 3.1
                                                                       bow of i: 1.1
                                                                                                  tail of i: 5.1
                                                                                                                            gama_i0: 13.0
                                                                                                                                                        gama_i1: 15.0
                    duration_time_i: 2.0
                                                       demand_i: 100.0
                                                                                      work load_i: 100.0
                                                                                                                       work load gap_i: 0
119
          V_id: 6
                                                                                                                            gama_i0: 9.0
                              1i: 3.0
                                                   xi: 1.8
                                                                       bow of i: 0.3
                                                                                                  tail of i: 3.3
                                                                                                                                                        gama_i1: 10.0
                                                       demand_i: 60.0
                    duration_time_i: 1.0
                                                                                      work load_i: 60.0
                                                                                                                       work load gap_i: 0
                                                                                                                                                        gama_i1: 17.0
120
          V_id: 7
                              li: 5.0
                                                   xi: 4.7
                                                                       bow of i: 2.2
                                                                                                  tail of i: 7.2
                                                                                                                           gama_i0: 15.0
                                                                                                                       work load gap_i: 0
                                                       demand i: 140.0
                                                                                      work load i: 140.0
                    duration time i: 2.0
          V_id: 8
121
                              li: 7.0
                                                   xi: 6.6
                                                                       bow of i: 3.1
                                                                                                  tail of i: 10.1
                                                                                                                              gama i0: 17.0
                                                                                                                                                          gama_i1: 18.
     0
                    duration time i: 1.0
                                                        demand i: 60.0
                                                                                      work load i: 60.0
                                                                                                                       work load gap i: 0
122
          V_id: 9
                                                                                                                           gama_i0: 18.0
                              li: 7.0
                                                   xi: 4.5
                                                                       bow of i: 1.0
                                                                                                  tail of i: 8.0
                                                                                                                                                        gama_i1: 20.0
                                                       demand i: 120.0
                    duration_time_i: 2.0
                                                                                      work load i: 120.0
                                                                                                                       work load gap_i: 0
                                                                         bow of i: 2.0
          V_id: 10
123
                                 li: 5.0
                                                     xi: 4.5
                                                                                                     tail of i: 7.0
                                                                                                                              gama_i0: 20.0
                                                                                                                                                          gama_i1: 22.
     0
                                                        demand_i: 120.0
                                                                                      work load i: 120.0
                                                                                                                       work load gap_i: 0
                    duration time i: 2.0
124
          V id: 11
                                li: 5.0
                                                     xi: 6.4
                                                                         bow of i: 3.9
                                                                                                     tail of i: 8.9
                                                                                                                              gama i0: 25.0
                                                                                                                                                          gama i1: 27.
     0
                    duration_time_i: 2.0
                                                       demand i: 120.0
                                                                                      work load i: 120.0
                                                                                                                       work load gap_i: 0
125
                                                                         bow of i: 0.3
          V_id: 12
                                1i: 7.0
                                                     xi: 3.8
                                                                                                     tail of i: 7.3
                                                                                                                              gama_i0: 5.0
                                                                                                                                                          gama_i1: 6.0
                    duration_time_i: 1.0
                                                       demand_i: 80.0
                                                                                      work load_i: 80.0
                                                                                                                       work load gap_i: 0
                                                                                                                              gama_i0: 27.0
126
          V id: 13
                                                                         bow of i: 2.0
                                                     xi: 5.0
                                                                                                     tail of i: 8.0
                                                                                                                                                          gama_i1: 30.
                                li: 6.0
                                                       demand_i: 100.0
                                                                                                                       work load gap_i: 0
     0
                    duration time i: 3.0
                                                                                      work load i: 100.0
127
          V id: 14
                                 li: 5.0
                                                     xi: 3.8
                                                                         bow of i: 1.3
                                                                                                     tail of i: 6.3
                                                                                                                              gama i0: 30.0
                                                                                                                                                          gama i1: 34.
                                                       demand i: 140.0
     0
                    duration time i: 4.0
                                                                                      work load i: 140.0
                                                                                                                       work load gap i: 0
128
          V_id: 15
                                li: 6.0
                                                                           bow of i: 9.5
                                                                                                       tail of i: 15.5
                                                                                                                                   gama_i0: 4.0
                                                     xi: 12.5
                                                                                                                                                               gama_i1
                                                             demand\_i{:}\ 140.0
      8.0
                         duration_time_i: 4.0
                                                                                           work load_i: 140.0
                                                                                                                            work load gap_i: 0
129
                                                     xi: 4.3
                                                                                                     tail of i: 7.8
                                                                                                                              gama_i0: 8.0
                                                                                                                                                          gama_i1: 9.0
                                 li: 7.0
                                                                         bow of i: 0.8
                    duration time i: 1.0
                                                       demand i: 100.0
                                                                                      work load i: 100.0
                                                                                                                       work load gap_i: 0
                                                                                                                                   gama_i0: 1.0
                                                                            bow of i: 7.5
                                                                                                       tail of i: 14.5
130
          V_id: 17
                                li: 7.0
                                                     xi: 11.0
                                                                                                                                                               gama_i1
                                                                                           work load i: 100.0
                         duration time i: 3.0
                                                             demand i: 100.0
                                                                                                                            work load gap_i: 0
131
132 Algorithm finished and the total CPU time: 1264 s
133 End
134
```