```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=58354
 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_11_9 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 = 33
       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] = 35.30 temp_best_value_gen = 35.30
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 35.30 temp_best_value_gen = 35.30
40
     No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 1
41
42
     solution chromosome =
43
        first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
        second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
44
       third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
obj[gen-1] = 35.30 temp_best_value_gen = 35.30
49
50
     No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 2
51
     solution chromosome =
52
        first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
53
        second level: [ 2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
54
       third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 35.30 temp best value gen = 35.30
59
     No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 3
60
     solution chromosome =
        first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
61
       second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.] third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
62
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 35.30 temp_best_value_gen = 35.30
68
     No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 4
69
     solution chromosome =
70
        first level: [[3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
71
        second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
        third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 35.30 temp best value gen = 35.30
76
     No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 5
77
     solution chromosome =
78
        first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
```

```
80
           second level: [ 2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
 81
          third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 35.30 temp best value gen = 35.30
       No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 6
 86
 87
        solution chromosome =
 88
          first level: [ ] 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
          second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.] third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
 89
 90
 91
        The No. 6 iteration is finished!
 92
 93
     Beging the No. 7 iteration:
        obj[gen-1] = 35.30 temp_best_value_gen = 35.30
 94
 95
        No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 7
 96
       solution chromosome =
 97
          first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
 98
          second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
 99
          third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
100
        The No. 7 iteration is finished!
101
     Beging the No. 8 iteration:
102
103
       obi[gen-1] = 35.30 temp best value gen = 35.30
104
       No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 8
105
        solution chromosome
          first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
106
          second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.] third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
107
108
109
        The No. 8 iteration is finished!
110
     Beging the No. 9 iteration:
111
112
        obj[gen-1] = 35.30 temp_best_value_gen = 35.30
        No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 9
113
114
       solution chromosome =
115
          first level: [[3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
116
          second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
          third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]
117
118
        The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
       obj[gen-1] = 35.30 temp_best_value_gen = 35.30
121
122
       No, maintain solution and obj[gen] = 35.30, and the tolerance_counter = 10
123
        solution chromosome =
124
          first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
125
          second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
126
          third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
127
        The No. 10 iteration is finished!
128
129
130
131
    The iteration is terminated and then visulize the solution:
132
       solution chromosome =
          first level: [ [ 3. 10. 16.5 21. 26. 26. 2.5 1.5 2. 2.5 1.5]
133
134
          second level: [2. 7. 2. 2. 1. 5. 4. 6. 9. 1. 12.]
135
          third level: [4. 3. 2. 2. 2. 7. 4. 1. 3. 4. 3.]]
136
        Objective function values and some other indicators:
                                                        Obj0 + Obj1 = 101.00
137
          Obi0 = 14.00
                                 Obj1 = 87.00
138
           Total movement of crane: 24.00
139
          Total waiting time in berth position: 51.00
140
          Total index of q during berthing: 439.00
141
        Specific arrangement for each vessel:
                                                                                                                             gama i0: 2.0
142
           V_id: 0
                              li: 6.0
                                                                        bow of i: 0.0
                                                                                                   tail of i: 6.0
                                                                                                                                                         gama i1: 4.0
                    duration_time_i: 2.0
                                                        demand_i: 140.0
                                                                                       work load_i: 140.0
                                                                                                                        work load gap_i: 0
          V\_id{:}\ 1
                                                                          bow of i: 6.0
143
                              li: 8.0
                                                   xi: 10.0
                                                                                                      tail of i: 14.0
                                                                                                                                  gama_i0: 7.0
                                                                                                                                                              gama_i1:
     10.0
                          duration_time_i: 3.0
                                                             demand_i: 140.0
                                                                                            work load_i: 140.0
                                                                                                                              work load gap_i: 0
           V_id: 2
144
                                                   xi: 16.5
                                                                          bow of i: 14.0
                                                                                                      tail of i: 19.0
                                                                                                                                  gama i0: 2.0
                              li: 5.0
                                                                                                                                                              gama il: 4
                       duration time i: 2.0
                                                           demand i: 60.0
                                                                                         work load i: 60.0
                                                                                                                           work load gap i: 0
                                                                          bow of i: 19.0
                                                                                                                                  gama_i0: 2.0
145
           V id: 3
                              li: 4.0
                                                   xi: 21.0
                                                                                                      tail of i: 23.0
                                                                                                                                                              gama i1:5
                                                                                         work load_i: 100.0
                                                                                                                           work load gap_i: 0
     .0
                       duration_time_i: 3.0
                                                           demand_i: 100.0
146
          V_id: 4
                                                                                                      tail of i: 29.0
                                                                                                                                  gama_i0: 1.0
                                                   xi: 26.0
                                                                          bow of i: 23.0
                                                                                                                                                              gama_i1: 4
                              li: 6.0
                                                                                                                           work load gap_i: 0
     .0
                       duration_time_i: 3.0
                                                           demand_i: 120.0
                                                                                         work load_i: 120.0
                                                                                                                                  gama_i0: 5.0
147
           V_id: 5
                              li: 8.0
                                                   xi: 26.0
                                                                          bow of i: 22.0
                                                                                                      tail of i: 30.0
                                                                                                                                                              gama_i1: 6
                                                           demand_i: 80.0
                                                                                         work load i: 80.0
                                                                                                                           work load gap i: 0
                       duration time i: 1.0
148
          V_id: 6
                                                   xi: 2.5
                                                                       bow of i: 0.0
                                                                                                                             gama_i0: 4.0
                              1i: 5.0
                                                                                                    tail of i: 5.0
                                                                                                                                                         gama_i1: 6.0
                                                        demand i: 160.0
                     duration time i: 2.0
                                                                                       work load i: 160.0
                                                                                                                        work load gap i: 0
149
           V_id: 7
                              li: 3.0
                                                   xi: 1.5
                                                                        bow of i: 0.0
                                                                                                   tail of i: 3.0
                                                                                                                             gama_i0: 6.0
                                                                                                                                                         gama_i1: 9.0
                     duration_time_i: 3.0
                                                        demand i: 60.0
                                                                                       work load i: 60.0
                                                                                                                        work load gap_i: 0
150
          V_id: 8
                                                                                                    tail of i: 4.0
                              li: 4.0
                                                   xi: 2.0
                                                                       bow of i: 0.0
                                                                                                                             gama_i0: 9.0
                                                                                                                                                         gama_i1: 12.0
                     duration_time_i: 3.0
                                                        demand_i: 140.0
                                                                                       work load_i: 140.0
                                                                                                                        work load gap_i: 0
151
           V id: 9
                              li: 5.0
                                                   xi: 2.5
                                                                       bow of i: 0.0
                                                                                                    tail of i: 5.0
                                                                                                                             gama i0: 1.0
                                                                                                                                                         gama i1: 2.0
                                                        demand i: 80.0
                                                                                                                        work load gap_i: 0
                    duration_time_i: 1.0
                                                                                       work load i: 80.0
                                                                          bow of i: 0.0
           V_id: 10
                                                                                                      tail of i: 3.0
152
                                 li: 3.0
                                                      xi: 1.5
                                                                                                                                gama_i0: 12.0
                                                                                                                                                            gama_i1: 15.
     0
                    duration_time_i: 3.0
                                                        demand i: 160.0
                                                                                       work load_i: 160.0
                                                                                                                        work load gap_i: 0
```

## unknown

153 154 155 156	Algorithm finished and the total CPU time: 1224 s End