```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=32708
 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.
   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_10_6_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 = 30
       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] = 32.30 temp_best_value_gen = 32.30
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 32.30 temp_best_value_gen = 32.30
40
     No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 1
41
42
     solution chromosome =
43
        first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
44
        second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
       third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
obj[gen-1] = 32.30 temp_best_value_gen = 32.30
49
50
     No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 2
51
     solution chromosome =
52
        first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
53
        second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
54
       third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 32.30 temp best value gen = 32.30
59
     No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 3
60
     solution chromosome =
        first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
61
       second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.] third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
62
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 32.30 temp_best_value_gen = 32.30
68
     No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 4
69
     solution chromosome =
        first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
70
71
        second level: [ 3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
        third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 32.30 temp best value gen = 32.30
76
     No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 5
77
     solution chromosome =
78
        first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
```

```
80
          second level: [ 3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
          third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
 81
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 32.30 temp best value gen = 32.30
       No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 6
 86
 87
        solution chromosome =
 88
          first level: [ ] 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
 89
          second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
 90
          third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
 91
        The No. 6 iteration is finished!
 92
 93
     Beging the No. 7 iteration:
 94
        obj[gen-1] = 32.30 temp_best_value_gen = 32.30
 95
        No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 7
 96
       solution chromosome =
 97
          first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
 98
          second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
 99
          third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
100
        The No. 7 iteration is finished!
101
     Beging the No. 8 iteration:
102
       obj[gen-1] = 32.30 temp best value gen = 32.30
103
104
       No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 8
105
        solution chromosome =
          first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
106
          second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.] third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
107
108
109
        The No. 8 iteration is finished!
110
     Beging the No. 9 iteration:
111
112
        obj[gen-1] = 32.30 temp_best_value_gen = 32.30
        No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 9
113
114
       solution chromosome =
          first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
115
116
          second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
          third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
117
118
        The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 32.30 temp_best_value_gen = 32.30
121
122
       No, maintain solution and obj[gen] = 32.30, and the tolerance_counter = 10
123
        solution chromosome =
124
          first level: [ [ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
125
          second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
126
          third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
127
        The No. 10 iteration is finished!
128
129
130
131 The iteration is terminated and then visulize the solution:
132
       solution chromosome =
133
          first level: [[ 3.5 10. 14.5 19. 24. 26.5 3.5 2. 1.5 2.5]
134
          second level: [3. 5. 7. 3. 1. 6. 1. 5. 9. 12.]
135
          third level: [4. 2. 3. 2. 4. 2. 7. 2. 2. 3.]]
136
        Objective function values and some other indicators:
                                                       Obj0 + Obj1 = 89.00
137
          Obj0 = 13.00
                                Obj1 = 76.00
138
          Total movement of crane: 24.00
139
          Total waiting time in berth position: 52.00
140
          Total index of q during berthing: 457.00
141
        Specific arrangement for each vessel:
                              li: 7.0
                                                                                                                            gama i0: 3.0
142
          V id: 0
                                                                       bow of i: 0.0
                                                                                                  tail of i: 7.0
                                                                                                                                                       gama i1: 4.0
                    duration_time_i: 1.0
                                                       demand_i: 60.0
                                                                                      work load_i: 60.0
                                                                                                                       work load gap_i: 0
143
          V_id: 1
                              li: 6.0
                                                   xi: 10.0
                                                                         bow of i: 7.0
                                                                                                     tail of i: 13.0
                                                                                                                                 gama_i0: 5.0
                                                                                                                                                             gama_i1: 8
                       duration_time_i: 3.0
                                                          demand_i: 100.0
                                                                                         work load_i: 100.0
                                                                                                                          work load gap_i: 0
     .0
144
                                                  xi: 14.5
                                                                         bow of i: 13.0
                                                                                                     tail of i: 16.0
                                                                                                                                 gama i0: 7.0
          V_id: 2
                              li: 3.0
                                                                                                                                                             gama il:
     10.0
                         duration_time_i: 3.0
                                                                                           work load i: 140.0
                                                                                                                            work load gap i: 0
                                                             demand_i: 140.0
                                                                                                                                 gama_i0: 3.0
145
          V id: 3
                              li: 6.0
                                                   xi: 19.0
                                                                         bow of i: 16.0
                                                                                                     tail of i: 22.0
                                                                                                                                                             gama i1:5
                                                          demand_i: 60.0
                                                                                        work load_i: 60.0
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 2.0
146
                                                                         bow of i: 22.0
                                                                                                     tail of i: 26.0
          V_id: 4
                              li: 4.0
                                                  xi: 24.0
                                                                                                                                 gama_i0: 1.0
                                                                                                                                                             gama_i1: 3
                                                                                                                         work load gap_i: 0
     .0
                       duration_time_i: 2.0
                                                          demand_i: 120.0
                                                                                         work load_i: 120.0
                                                                                                                                 gama_i0: 6.0
147
          V_id: 5
                              li: 7.0
                                                   xi: 26.5
                                                                         bow of i: 23.0
                                                                                                     tail of i: 30.0
                                                                                                                                                             gama_i1: 9
                                                                                        work load i: 120.0
                                                                                                                         work load gap i: 0
                       duration time i: 3.0
                                                          demand i: 120.0
148
          V_id: 6
                                                   xi: 3.5
                                                                       bow of i: 0.0
                                                                                                                            gama_i0: 1.0
                              1i: 7.0
                                                                                                  tail of i: 7.0
                                                                                                                                                        gama_i1: 2.0
                                                        demand i: 80.0
                    duration time i: 1.0
                                                                                      work load i: 80.0
                                                                                                                       work load gap i: 0
                                                                                                  tail of i: 4.0
149
          V_id: 7
                              li: 4.0
                                                   xi: 2.0
                                                                       bow of i: 0.0
                                                                                                                            gama_i0: 5.0
                                                                                                                                                       gama_i1: 9.0
                    duration_time_i: 4.0
                                                        demand i: 160.0
                                                                                      work load_i: 160.0
                                                                                                                       work load gap_i: 0
150
          V_id: 8
                              li: 3.0
                                                   xi: 1.5
                                                                       bow of i: 0.0
                                                                                                  tail of i: 3.0
                                                                                                                            gama_i0: 9.0
                                                                                                                                                        gama_i1: 12.0
                    duration_time_i: 3.0
                                                        demand_i: 120.0
                                                                                      work load_i: 120.0
                                                                                                                       work load gap_i: 0
151
          V id: 9
                                                                       bow of i: 0.0
                              li: 5.0
                                                  xi: 2.5
                                                                                                  tail of i: 5.0
                                                                                                                            gama i0: 12.0
                                                                                                                                                        gama i1: 14.0
                                                        demand i: 100.0
                                                                                      work load i: 100.0
                                                                                                                       work load gap_i: 0
                    duration_time_i: 2.0
152
153 Algorithm finished and the total CPU time: 1145 s
```

154 End		
154 End 155		