```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=33778
 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_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 = 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] = 42.00 temp_best_value_gen = 42.00
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 42.00 temp_best_value_gen = 40.20
40
     Yes, update solution and obj[gen] = 40.20
41
     solution chromosome =
42
43
       first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
       second level: [2. 2. 1. 1.11. 6. 1. 9. 2.14.]
44
45
       third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
49
     obj[gen-1] = 40.20 temp_best_value_gen = 40.20
50
     No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 1
51
     solution chromosome =
       first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
52
53
       second level: [2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
54
       third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 40.20 temp best value gen = 40.20
59
     No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 2
60
     solution chromosome =
61
       first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
       second level: [2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
62
       third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 40.20 temp_best_value_gen = 40.20
68
     No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 3
69
     solution chromosome =
70
       first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
       second level: [ 2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
71
       third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 40.20 temp best value gen = 40.20
76
     No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 4
77
78
     solution chromosome =
        first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
```

```
80
           second level: [2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
 81
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 84
 85
        obj[gen-1] = 40.20 temp best value gen = 40.20
        No, maintain solution and obj[gen] = \overline{40.20}, and the tolerance_counter = 5
 86
 87
        solution chromosome =
 88
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
 89
          second level: [ 2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
 90
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 40.20 temp_best_value_gen = 40.20
 95
        No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 6
 96
        solution chromosome =
 97
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
          second level: [2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
 98
 99
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
100
        The No. 7 iteration is finished!
101
     Beging the No. 8 iteration:
102
103
        obi[gen-1] = 40.20 temp best value gen = 40.20
104
        No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 7
105
        solution chromosome =
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
106
          second level: [2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
107
108
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 40.20 temp_best_value_gen = 40.20
113
        No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 8
114
        solution chromosome =
115
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
116
          second level: [ 2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]
117
        The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 40.20 temp_best_value_gen = 40.20
121
122
        No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 9
123
        solution chromosome =
124
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
125
          second level: [2. 2. 1. 1.11. 6. 1. 9. 2.14.]
126
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
127
        The No. 10 iteration is finished!
128
129
     Beging the No. 11 iteration:
        obj[gen-1] = 40.20 temp best value gen = 40.20
130
131
        No, maintain solution and obj[gen] = 40.20, and the tolerance_counter = 10
132
        solution chromosome =
133
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
134
          second level: [ 2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
135
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]
136
        The No. 11 iteration is finished!
137
138
139
140 The iteration is terminated and then visulize the solution:
141
        solution chromosome =
          first level: [ [ 1.5 6. 12.5 20. 3.5 2. 4.5 4. 26.5 2. ]
142
143
          second level: [2. 2. 1. 1. 11. 6. 1. 9. 2. 14.]
          third level: [2. 6. 7. 6. 2. 2. 3. 2. 3. 2.]]
144
145
        Objective function values and some other indicators:
                                                       Obj0 + Obj1 = 96.00
146
          Obj0 = 17.00
                                 Obj1 = 79.00
          Total movement of crane: 30.00
147
148
          Total waiting time in berth position: 49.00
149
          Total index of q during berthing: 337.00
150
        Specific arrangement for each vessel:
                                                                                                                           gama_i0: 2.0
151
           V_id: 0
                              li: 3.0
                                                  xi: 1.5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 3.0
                                                                                                                                                       gama_i1: 6.0
                    duration_time_i: 4.0
                                                       demand_i: 160.0
                                                                                      work load i: 160.0
                                                                                                                      work load gap_i: 0
152
                                                  xi: 6.0
           V id: 1
                              li: 6.0
                                                                      bow of i: 3.0
                                                                                                  tail of i: 9.0
                                                                                                                           gama i0: 2.0
                                                                                                                                                       gama i1: 4.0
                                                       demand i: 160.0
                                                                                     work load_i: 160.0
                    duration_time_i: 2.0
                                                                                                                      work load gap_i: 0
153
           V id: 2
                              li: 7.0
                                                  xi: 12.5
                                                                         bow of i: 9.0
                                                                                                    tail of i: 16.0
                                                                                                                                gama i0: 1.0
                                                                                                                                                            gama i1:2
     .0
                       duration_time_i: 1.0
                                                          demand_i: 140.0
                                                                                        work load_i: 140.0
                                                                                                                         work load gap_i: 0
                                                                                                                                gama_i0: 1.0
          V_id: 3
154
                              1i: 8.0
                                                  xi: 20.0
                                                                         bow of i: 16.0
                                                                                                    tail of i: 24.0
                                                                                                                                                           gama_i1: 2
                                                                                        work load_i: 80.0
                       duration_time_i: 1.0
                                                          demand i: 80.0
                                                                                                                        work load gap_i: 0
155
          V id: 4
                              li: 7.0
                                                  xi: 3.5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 7.0
                                                                                                                           gama_i0: 11.0
                                                                                                                                                       gama i1: 14.0
                                                       demand i: 100.0
                    duration time i: 3.0
                                                                                     work load i: 100.0
                                                                                                                      work load gap i: 0
156
           V id: 5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 4.0
                                                                                                                           gama_i0: 6.0
                                                                                                                                                       gama_i1: 9.0
                              li: 4.0
                                                  xi: 2.0
                                                       demand_i: 120.0
                                                                                     work load_i: 120.0
                    duration_time_i: 3.0
                                                                                                                      work load gap_i: 0
157
           V id: 6
                                                  xi: 4.5
                                                                      bow of i: 0.0
                                                                                                  tail of i: 9.0
                                                                                                                           gama_i0: 1.0
                                                                                                                                                       gama_i1: 2.0
                              1i: 9.0
```

unknown						
157 158 159 160	V_id: 7 V_id: 8	duration_time_i: 2.0 8 li: 3.0 duration_time_i: 2.0	demand_i: 60.0 xi: 4.0 bow of i: 0.0 demand_i: 60.0 xi: 26.5 bow of i: 25 demand_i: 120.0 xi: 2.0 bow of i: 0.0	work load_i: 60.0 tail of i: 8.0 work load_i: 60.0 5.0 tail of i: 28.0 work load_i: 120.0 tail of i: 4.0	work load gap_i: 0 gama_i0: 9.0 work load gap_i: 0 gama_i0: 2.0 work load gap_i: 0 gama_i0: 14.0	gama_i1: 11.0 gama_i1: 4 gama_i1: 18.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0	guiia_11. 10.0
161 162 163 164	Algorithm fi End	inished and the total CPU tin	ne: 1249 s			