```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=14164
3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   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_4_7 _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 = 12
       Iter_num_GA = 300
24
25
       Select_rate = 0.85
26
       Crossover rate = 0.95
       Mutation rate = 0.95
27
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] = 17.52 temp_best_value_gen = 17.52
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 17.52 temp_best_value_gen = 17.52
40
41
     No, maintain solution and obj[gen] = 17.52, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [5.29 2.49 6.27 6.35]
       second level: [4. 1. 6. 3.]
44
       third level: [4. 4. 6. 8.]]
45
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 17.52 temp_best_value_gen = 14.04
49
50
     Yes, update solution and obj[gen] = 14.04
51
     solution chromosome =
       first level: [ [5.84 5.03 4.75 7.19]
52
53
       second level: [6. 1. 3. 5.]
54
       third level: [8. 4. 6. 8.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 14.04 temp best value gen = 14.04
59
     No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [5.84 5.03 4.75 7.19]
62
       second level: [6. 1. 3. 5.]
       third level: [8. 4. 6. 8.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 14.04 temp_best_value_gen = 14.04
68
     No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 2
69
     solution chromosome =
       first level: [ [5.84 5.03 4.75 7.19]
70
       second level: [6. 1. 3. 5.]
71
       third level: [8. 4. 6. 8.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 14.04 temp best value gen = 14.04
76
     No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 3
77
78
     solution chromosome =
       first level: [ [5.84 5.03 4.75 7.19]
```

```
80
          second level: [6. 1. 3. 5.]
 81
          third level: [8. 4. 6. 8.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 14.04 temp best value gen = 14.04
       No, maintain solution and obj[gen] = \overline{14.04}, and the tolerance_counter = 4
 86
 87
        solution chromosome =
 88
          first level: [ [5.84 5.03 4.75 7.19]
 89
          second level: [6. 1. 3. 5.]
 90
          third level: [8. 4. 6. 8.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 14.04 temp_best_value_gen = 14.04
 94
 95
        No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 5
 96
       solution chromosome =
          first level: [ [5.84 5.03 4.75 7.19]
 97
 98
          second level: [6. 1. 3. 5.]
 99
          third level: [8. 4. 6. 8.]]
100
       The No. 7 iteration is finished!
101
102
     Beging the No. 8 iteration:
       obj[gen-1] = 14.04 temp best value gen = 14.04
103
104
       No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 6
105
        solution chromosome
          first level: [ [5.84 5.03 4.75 7.19]
106
          second level: [6. 1. 3. 5.]
107
          third level: [8. 4. 6. 8.]]
108
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 14.04 temp_best_value_gen = 14.04
113
        No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 7
114
       solution chromosome =
          first level: [ [5.84 5.03 4.75 7.19]
115
116
          second level: [6. 1. 3. 5.]
          third level: [8, 4, 6, 8,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
       obj[gen-1] = 14.04 temp_best_value_gen = 14.04
121
       No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 8
122
123
        solution chromosome =
124
          first level: [ [5.84 5.03 4.75 7.19]
125
          second level: [6. 1. 3. 5.]
126
          third level: [8. 4. 6. 8.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
        obj[gen-1] = 14.04 temp_best_value_gen = 14.04
130
131
       No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 9
132
       solution chromosome =
          first level: [ [5.84 5.03 4.75 7.19]
133
134
          second level: [6. 1. 3. 5.]
135
          third level: [8. 4. 6. 8.]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 14.04 temp_best_value_gen = 14.04
140
       No, maintain solution and obj[gen] = 14.04, and the tolerance_counter = 10
141
        solution chromosome =
          first level: [ [5.84 5.03 4.75 7.19]
142
143
          second level: [6. 1. 3. 5.]
          third level: [8. 4. 6. 8.]]
144
145
        The No. 12 iteration is finished!
146
147
148
149 The iteration is terminated and then visulize the solution:
150
       solution chromosome =
          first level: [ [5.84 5.03 4.75 7.19]
151
152
          second level: [6. 1. 3. 5.]
153
          third level: [8. 4. 6. 8.]]
154
        Objective function values and some other indicators:
155
          Obj0 = 6.00
                                Obj1 = 26.38
                                                       Obj0 + Obj1 = 32.38
156
          Total movement of crane: 11.38
157
          Total waiting time in berth position: 15.00
158
          Total index of q during berthing: 125.00
159
        Specific arrangement for each vessel:
160
                              li: 9.0
          V id: 0
                                                  xi: 5.8
                                                                      bow of i: 1.3
                                                                                                  tail of i: 10.3
                                                                                                                             gama i0: 6.0
                                                                                                                                                         gama i1: 7.0
                                                                                     work load i: 140.0
                    duration_time_i: 1.0
                                                       demand_i: 140.0
                                                                                                                      work load gap_i: 0
                                                                      bow of i: 3.0
161
          V_id: 1
                                                                                                  tail of i: 7.0
                              li: 4.0
                                                  xi: 5.0
                                                                                                                          gama_i0: 1.0
                                                                                                                                                      gama_i1: 3.0
                    duration_time_i: 2.0
                                                       demand i: 140.0
                                                                                     work load_i: 140.0
                                                                                                                      work load gap_i: 0
```

	own							
162	$V_{-}$	id: 2	duration	li: 9.0	xi: 4.8 bow of i: 0.3	tail of i: 9.3	gama_i0: 3.0	gama_i1: 5.0
163		id: 3	duration	time_i: 2.0 li: 8.0 ı_time_i: 1.0	demand_i: 140.0 xi: 7.2 bow of i: 3.2 demand_i: 160.0	work load_i: 140.0 2 tail of i: 11.2 work load_i: 160.0	gama_i0: 3.0 work load gap_i: 0 gama_i0: 5.0 work load gap_i: 0	gama_i1: 6.0
64 65 66 67	Algorith End	ım fin	ished and	the total CPU tim	ne: 565 s			