```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=7747
 3
     import sys; print('Python %s on %s' % (sys.version, sys.platform))
     01_My_Python_Code', 'E:/1 \\ \text{0} \\ \
     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_2_1 _standard_test.xlsx optimization process solved by ENSGA-II algorithm.
14
15
     Start
16
17
     Before iteration:
18
         Read basic data
19
         Parameter setting:
            trail = 27
20
21
            Pop\_size = 10
             Tolerance iteration unchanged number = 10
23
             Chrom\_size = 6
            Iter_num_GA = 300
24
25
             Select_rate = 0.95
26
             Crossover rate = 0.75
             Mutation rate = 0.9
27
28
             Mu_oper_type = 1
29
             vessel\_move\_way = 2
30
            coefficient for Obj1= 1.5
            coefficient for Obj2= 0.5
31
             gen = 0
32
33
34
     Iteration begin:
35
     Beging the No. 0 iteration:
         obj[0] = 9.88 temp_best_value_gen = 9.88
36
37
         The No. 0 iteration is finished!
38
39
     Beging the No. 1 iteration:
40
         obj[gen-1] = 9.88 temp_best_value_gen = 9.88
41
         No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 1
42
         solution chromosome =
43
             first level: [[3.11 4.04]
            second level: [0, 3,]
44
            third level: [3. 4.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 9.88 temp_best_value_gen = 9.88
49
50
         No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 2
51
         solution chromosome =
52
             first level: [ [3.11 4.04]
53
             second level: [0.3.]
54
            third level: [3. 4.]]
55
         The No. 2 iteration is finished!
56
57
     Beging the No. 3 iteration:
58
         obi[gen-1] = 9.88 temp best value gen = 9.88
59
         No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 3
60
         solution chromosome =
61
             first level: [[3.11 4.04]
62
             second level: [0.3.]
            third level: [3. 4.]]
63
         The No. 3 iteration is finished!
64
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 9.88 temp_best_value_gen = 9.88
68
         No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 4
69
         solution chromosome =
70
             first level: [ [3.11 4.04]
71
             second level: [0.3.]
            third level: [3. 4.]]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obi[gen-1] = 9.88 temp best value gen = 9.88
76
         No, maintain solution and obj[gen] = 9.88, and the tolerance counter = 5
77
78
         solution chromosome =
             first level: [[3.11 4.04]
```

```
80
          second level: [0. 3.]
 81
          third level: [3. 4.]]
 82
       The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 9.88 temp best value gen = 9.88
       No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 6
 86
 87
        solution chromosome =
 88
          first level: [ [3.11 4.04]
 89
          second level: [0. 3.]
 90
          third level: [3. 4.]]
 91
       The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 9.88 temp_best_value_gen = 9.88
 94
 95
       No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 7
 96
       solution chromosome =
 97
          first level: [ [3.11 4.04]
 98
          second level: [0.3.]
 99
          third level: [3. 4.]]
100
       The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
       obj[gen-1] = 9.88 temp best value gen = 9.88
103
104
       No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 8
105
        solution chromosome =
          first level: [[3.11 4.04]
106
          second level: [0. 3.]
107
          third level: [3. 4.]]
108
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 9.88 temp_best_value_gen = 9.88
113
       No, maintain solution and obj[gen] = 9.88, and the tolerance_counter = 9
       solution chromosome =
114
115
          first level: [ [3.11 4.04]
116
          second level: [0.3.]
          third level: [3, 4,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
       obj[gen-1] = 9.88 temp_best_value_gen = 7.50
121
        Yes, update solution and obj[gen] = 7.50
122
123
       solution chromosome =
124
          first level: [ [2. 8.]
125
          second level: [0.3.]
126
          third level: [3. 4.]]
127
       The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
        obj[gen-1] = 7.50 temp_best_value_gen = 7.50
131
       No, maintain solution and obj[gen] = 7.50, and the tolerance_counter = 1
132
       solution chromosome =
133
          first level: [ [2. 8.]
134
          second level: [0.3.]
135
          third level: [3, 4,]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
       obj[gen-1] = 7.50 temp_best_value gen = 5.00
139
140
        Yes, update solution and obj[gen] = 5.00
141
        solution chromosome =
142
          first level: [ [2. 8.]
143
          second level: [0.1.]
          third level: [3. 2.]]
144
145
       The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
        obj[gen-1] = 5.00 temp_best_value_gen = 5.00
148
149
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 1
150
       solution chromosome =
151
          first level: [ [2. 8.]
152
          second level: [0. 1.]
153
          third level: [3. 2.]]
154
       The No. 13 iteration is finished!
155
156 Beging the No. 14 iteration:
157
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
158
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 2
159
        solution chromosome =
160
          first level: [ [2. 8.]
          second level: [0, 1,]
161
162
          third level: [3. 2.]]
163
        The No. 14 iteration is finished!
```

```
164
165 Beging the No. 15 iteration:
        obj[gen-1] = 5.00 temp_best_value_gen = 5.00
166
167
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 3
168
        solution chromosome =
169
          first level: [ [2, 8.]
          second level: [0. 1.]
170
171
          third level: [3. 2.]]
172
        The No. 15 iteration is finished!
173
174 Beging the No. 16 iteration:
175
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
       No, maintain solution and obj[gen] = 5.00, and the tolerance counter = 4
176
177
       solution chromosome =
178
          first level: [ [2. 8.]
179
          second level: [0. 1.]
180
          third level: [3. 2.]]
181
        The No. 16 iteration is finished!
182
183 Beging the No. 17 iteration:
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
184
185
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 5
186
        solution chromosome =
187
          first level: [ [2. 8.]
          second level: [0. 1.]
188
          third level: [3. 2.]]
189
190
       The No. 17 iteration is finished!
191
192
     Beging the No. 18 iteration:
193
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
194
       No, maintain solution and obj[gen] = 5.00, and the tolerance counter = 6
195
       solution chromosome =
196
          first level: [ [2. 8.]
197
          second level: [0. 1.]
198
          third level: [3. 2.]]
199
       The No. 18 iteration is finished!
200
201 Beging the No. 19 iteration:
202
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
203
        No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 7
204
        solution chromosome =
205
          first level: [ [2. 8.]
206
          second level: [0. 1.]
207
          third level: [3. 2.]]
208
        The No. 19 iteration is finished!
209
210 Beging the No. 20 iteration:
211
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
212
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 8
       solution chromosome =
213
          first level: [ [2. 8.]
214
215
          second level: [0.1.]
216
          third level: [3. 2.]]
       The No. 20 iteration is finished!
217
218
219 Beging the No. 21 iteration:
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
220
221
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 9
222
       solution chromosome
223
          first level: [ [2. 8.]
224
          second level: [0. 1.]
225
          third level: [3. 2.]]
226
       The No. 21 iteration is finished!
227
228 Beging the No. 22 iteration:
229
       obj[gen-1] = 5.00 temp_best_value_gen = 5.00
230
       No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 10
231
       solution chromosome =
232
          first level: [ [2. 8.]
233
          second level: [0.1.]
234
          third level: [3. 2.]
235
       The No. 22 iteration is finished!
236
237
238
239 The iteration is terminated and then visulize the solution:
240
       solution chromosome
241
          first level: [ [2. 8.]
          second level: [0.1.]
242
243
          third level: [3. 2.]]
244
        Objective function values and some other indicators:
                                Obj1 = 1.00
                                                      Obj0 + Obj1 = 4.00
245
          Obi0 = 3.00
          Total movement of crane: 0.00
246
247
          Total waiting time in berth position: 1.00
```

unkno									
248	Total	index	of q du	ring bert	hing: 34.00				
249 250	Specific V_id:	0		li: 4.0		xi: 2.0 bow of i: 0.0	tail of i: 4.0	gama_i0: 0.0	gama_i1: 3.0
		dı	uration_	_time_i: li: 8.0	3.0	demand i: 160.0	work load i: 160.0	work load gap_i: 0 gama_i0: 1.0 work load gap_i: 0	
251	V_id:	1 di	uration	li: 8.0 _time_i:	3.0	xi: 8.0 bow of i: 4.0 demand_i: 120.0	tail of i: 12.0 work load_i: 120.0	gama_i0: 1.0	gama_i1: 4.0
252							work load_1. 120.0	work road gap_i. o	
253	Algorithm End	finish	ed and t	the total	CPU time:	192 s			
255	Enu								
ĺ									