```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=32182
 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:
20
            trail = 16
21
            Pop\_size = 20
             Tolerance iteration unchanged number = 6
23
             Chrom\_size = 6
            Iter_num_GA = 300
24
25
             Select_rate = 0.95
26
             Crossover rate = 0.9
             Mutation rate = 0.95
27
28
             Mu_oper_type = 2
29
             vessel\_move\_way = 2
30
            coefficient for Obj1= 0.5
            coefficient for Obj2= 1.5
31
             gen = 0
32
33
     Iteration begin:
34
35
     Beging the No. 0 iteration:
         obj[0] = 14.76 temp_best_value_gen = 14.76
36
37
         The No. 0 iteration is finished!
38
39
     Beging the No. 1 iteration:
         obj[gen-1] = 14.76 temp_best_value_gen = 14.76
40
41
         No, maintain solution and obj[gen] = 14.76, and the tolerance_counter = 1
42
         solution chromosome =
43
             first level: [ [2.09 4.1 ]
            second level: [0, 4.]
44
            third level: [2. 6.]]
45
46
         The No. 1 iteration is finished!
47
48
     Beging the No. 2 iteration:
         obj[gen-1] = 14.76 temp_best_value_gen = 14.76
49
50
         No, maintain solution and obj[gen] = 14.76, and the tolerance_counter = 2
51
         solution chromosome =
52
             first level: [[2.09 4.1]
53
             second level: [0. 4.]
54
            third level: [2. 6.]]
55
         The No. 2 iteration is finished!
56
57
     Beging the No. 3 iteration:
58
         obi[gen-1] = 14.76 temp best value gen = 14.76
59
         No, maintain solution and obj[gen] = 14.76, and the tolerance_counter = 3
60
         solution chromosome =
61
             first level: [ [2.09 4.1 ]
62
             second level: [0. 4.]
            third level: [2. 6.]]
63
         The No. 3 iteration is finished!
64
65
     Beging the No. 4 iteration:
66
67
         obj[gen-1] = 14.76 temp_best_value_gen = 14.76
68
         No, maintain solution and obj[gen] = 14.76, and the tolerance_counter = 4
69
         solution chromosome =
70
            first level: [ [2.09 4.1 ]
71
             second level: [0, 4.]
            third level: [2. 6.]
73
         The No. 4 iteration is finished!
74
75
     Beging the No. 5 iteration:
         obj[gen-1] = 14.76 temp_best_value_gen = 14.76
76
         No, maintain solution and obj[gen] = 14.76, and the tolerance_counter = 5
77
78
         solution chromosome =
             first level: [ [2.09 4.1 ]
```

```
80
          second level: [0, 4,]
 81
          third level: [2. 6.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
        obj[gen-1] = 14.76 temp best value gen = 12.58
        Yes, update solution and obj[gen] = 12.58
 86
 87
        solution chromosome =
 88
          first level: [[2.13 4.07]
 89
          second level: [3. 0.]
 90
          third level: [3. 4.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 12.58 temp_best_value_gen = 12.58
 94
 95
        No, maintain solution and obj[gen] = 12.58, and the tolerance_counter = 1
 96
        solution chromosome =
 97
          first level: [ [2.13 4.07]
 98
          second level: [3. 0.]
 99
          third level: [3, 4,]]
        The No. 7 iteration is finished!
100
101
102 Beging the No. 8 iteration:
        obj[gen-1] = 12.58 temp best value gen = 9.91
103
104
        Yes, update solution and obj[gen] = 9.91
105
        solution chromosome =
          first level: [ [2.32 4.04]
106
          second level: [2. 0.]
107
          third level: [2. 6.]]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 9.91 temp_best_value_gen = 9.91
113
        No, maintain solution and obj[gen] = 9.91, and the tolerance_counter = 1
        solution chromosome =
114
115
          first level: [ [2.32 4.04]
116
          second level: [2. 0.]
          third level: [2, 6,]]
117
118
        The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 9.91 temp_best_value_gen = 9.91
121
        No, maintain solution and obj[\overline{gen}] = \overline{9.91}, and the tolerance_counter = 2
122
123
        solution chromosome =
124
          first level: [ [2.32 4.04]
125
          second level: [2. 0.]
126
          third level: [2. 6.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
        obj[gen-1] = 9.91 temp_best_value_gen = 9.91
131
        No, maintain solution and obj[gen] = 9.91, and the tolerance_counter = 3
132
        solution chromosome =
133
          first level: [ [2.32 4.04]
134
          second level: [2. 0.]
135
          third level: [2. 6.]]
136
        The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
        obj[gen-1] = 9.91 temp_best_value_gen = 9.91
139
140
        No, maintain solution and obj[gen] = 9.91, and the tolerance_counter = 4
141
        solution chromosome =
142
          first level: [ [2.32 4.04]
          second level: [2. 0.]
143
          third level: [2. 6.]]
144
145
        The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
        obj[gen-1] = 9.91 temp_best_value_gen = 8.40
148
149
        Yes, update solution and obj[gen] = 8.40
150
        solution chromosome =
          first level: [ [2.32 4.02]
151
152
          second level: [2. 0.]
153
          third level: [2. 7.]]
154
        The No. 13 iteration is finished!
155
156 Beging the No. 14 iteration:
157
        obj[gen-1] = 8.40 temp_best_value_gen = 8.40
158
        No, maintain solution and obj[gen] = 8.40, and the tolerance_counter = 1
159
        solution chromosome =
160
          first level: [[2.32 4.02]
          second level: [2. 0.]
161
162
          third level: [2. 7.]]
163
        The No. 14 iteration is finished!
```

```
164
165 Beging the No. 15 iteration:
        obj[gen-1] = 8.40 temp_best_value_gen = 8.40
166
167
       No, maintain solution and obj[gen] = 8.40, and the tolerance_counter = 2
168
        solution chromosome =
169
          first level: [ [2.32 4.02]
170
          second level: [2. 0.]
171
          third level: [2. 7.]]
172
        The No. 15 iteration is finished!
173
174 Beging the No. 16 iteration:
175
       obj[gen-1] = 8.40 temp_best_value_gen = 7.64
        Yes, update solution and obj[gen] = 7.64
176
177
       solution chromosome =
178
          first level: [ [2.01 8. ]
179
          second level: [3. 0.]
180
          third level: [3. 7.]]
181
        The No. 16 iteration is finished!
182
183 Beging the No. 17 iteration:
       obj[gen-1] = 7.64 temp_best_value_gen = 7.64
184
185
       No, maintain solution and obj[gen] = 7.64, and the tolerance_counter = 1
186
        solution chromosome =
187
          first level: [ [2.01 8. ]
          second level: [3. 0.]
188
          third level: [3. 7.]]
189
190
       The No. 17 iteration is finished!
191
192 Beging the No. 18 iteration:
193
       obj[gen-1] = 7.64 temp_best_value_gen = 7.64
194
       No, maintain solution and obj[gen] = 7.64, and the tolerance counter = 2
195
       solution chromosome =
196
          first level: [ [2.01 8. ]
197
          second level: [3. 0.]
198
          third level: [3. 7.]]
199
       The No. 18 iteration is finished!
200
201 Beging the No. 19 iteration:
202
       obj[gen-1] = 7.64 temp_best_value_gen = 7.64
203
       No, maintain solution and obj[gen] = 7.64, and the tolerance_counter = 3
204
       solution chromosome =
205
          first level: [ [2.01 8. ]
206
          second level: [3. 0.]
207
          third level: [3. 7.]]
208
        The No. 19 iteration is finished!
209
210 Beging the No. 20 iteration:
211
       obj[gen-1] = 7.64 temp_best_value_gen = 7.64
212
       No, maintain solution and obj[gen] = 7.64, and the tolerance_counter = 4
       solution chromosome =
213
          first level: [ [2.01 8. ]
214
215
          second level: [3. 0.]
216
          third level: [3. 7.]]
       The No. 20 iteration is finished!
217
218
219 Beging the No. 21 iteration:
       obj[gen-1] = 7.64 temp_best_value_gen = 7.64
220
221
       No, maintain solution and obj[gen] = 7.64, and the tolerance_counter = 5
222
       solution chromosome
223
          first level: [[2.01 8.]]
          second level: [3. 0.]
224
225
          third level: [3. 7.]]
226
       The No. 21 iteration is finished!
227
228 Beging the No. 22 iteration:
229
       obj[gen-1] = 7.64 temp_best_value_gen = 7.64
       No, maintain solution and obj[gen] = \overline{7.64}, and the tolerance_counter = 6
230
231
       solution chromosome =
232
          first level: [ [2.01 8. ]
233
          second level: [3. 0.]
234
          third level: [3. 7.]
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: [ [2.01 8. ]
242
          second level: [3. 0.]
243
          third level: [3. 7.]]
244
        Objective function values and some other indicators:
245
          Obio = 5.00
                               Obj1 = 3.43
                                                      Obj0 + Obj1 = 8.43
          Total movement of crane: 0.43
246
247
          Total waiting time in berth position: 3.00
```

unknown									
248	Total	ind	ex of q du	iring berthing:	46.00				
249 250	Specific V_id:	arr	angement	for each vesse li: 4.0	el:	i: 2.0 bow of i: 0.0	tail of i: 4.0	gama_i0: 3.0	gama_i1: 6.0
230	v_Iu	. 0	duration	_time_i: 3.0	А	demand i: 160 0	work load i: 160.0	work load gap i: 0	gama_m. 0.0
251	V_id	: 1		1i: 8.0	X	i: 8.0 bow of i: 4.0 demand_i: 120.0	work load_i: 160.0 tail of i: 12.0 work load_i: 120.0	gama_i0: 0.0 work load gap_i: 0	gama_i1: 1.0
			duration	_time_i: 1.0		demand_i: 120.0	work load_i: 120.0	work load gap_i: 0	
252	Algorithm	fini	shed and	the total CPU t	time: 384	5 e			
254	End	11111	siicu aiiu	the total CFU i	ume. 36.	5 8			
255	End								