```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=14019
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')
  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 = 54
21
       Pop\_size = 10
       Tolerance iteration unchanged number = 6
23
       Chrom\_size = 6
       Iter_num_GA = 300
24
25
       Select_rate = 0.8
26
       Crossover rate = 0.9
       Mutation rate = 0.95
27
28
       Mu_oper_type = 1
29
       vessel\_move\_way = 1
30
       coefficient for Obj1= 1.5
       coefficient for Obj2= 0.5
31
       gen = 0
32
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
     obj[0] = 16.50 temp_best_value_gen = 16.50
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 16.50 temp_best_value_gen = 16.50
41
     No, maintain solution and obj[gen] = 16.50, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [2. 8.]
       second level: [3, 6,]
44
       third level: [2. 2.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 16.50 temp_best_value_gen = 16.50
49
50
     No, maintain solution and obj[gen] = 16.50, and the tolerance_counter = 2
51
     solution chromosome =
       first level: [ [2. 8.]
52
       second level: [3. 6.]
53
54
       third level: [2. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 16.50 temp best value gen = 11.00
     Yes, update solution and obj[gen] = 11.00
59
60
     solution chromosome =
61
       first level: [ [2. 8.]
62
       second level: [3. 1.]
       third level: [2. 3.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 11.00 temp_best_value_gen = 11.00
68
     No, maintain solution and obj[gen] = 11.00, and the tolerance_counter = 1
69
     solution chromosome =
70
       first level: [ [2. 8.]
71
       second level: [3. 1.]
       third level: [2. 3.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 11.00 temp best value gen = 10.89
76
     Yes, update solution and obj[gen] = 10.89
77
     solution chromosome =
78
       first level: [ [2.62 5.26]
```

```
second level: [1, 0,]
 81
          third level: [4. 8.]]
 82
        The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 10.89 temp_best_value_gen = 10.89
No, maintain solution_and_obj[gen] = 10.89, and the tolerance_counter = 1
 85
 86
 87
        solution chromosome =
 88
          first level: [ [2.62 5.26]
 89
          second level: [1. 0.]
 90
          third level: [4. 8.]]
 91
        The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
        obj[gen-1] = 10.89 temp_best_value_gen = 10.89
 94
 95
        No, maintain solution and obj[gen] = 10.89, and the tolerance_counter = 2
 96
        solution chromosome =
 97
          first level: [ [2.62 5.26]
 98
          second level: [1. 0.]
 99
          third level: [4. 8.]]
        The No. 7 iteration is finished!
100
101
102 Beging the No. 8 iteration:
        obj[gen-1] = 10.89 temp best value gen = 8.76
103
104
        Yes, update solution and obj[gen] = 8.76
105
        solution chromosome =
          first level: [ [4.12 5.26]
106
          second level: [0. 2.]
107
          third level: [4, 4,]
108
109
        The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 8.76 temp_best_value_gen = 5.50
113
        Yes, update solution and obj[gen] = 5.50
        solution chromosome =
114
115
          first level: [ [8. 4.]
116
          second level: [2. 0.]
          third level: [4, 4,]]
117
        The No. 9 iteration is finished!
118
119
120 Beging the No. 10 iteration:
        obj[gen-1] = 5.50 temp_best_value_gen = 5.50
121
        No, maintain solution and obj[gen] = 5.50, and the tolerance_counter = 1
122
123
        solution chromosome =
124
          first level: [ [8. 4.]
125
          second level: [2. 0.]
126
          third level: [4. 4.]]
127
        The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
        obj[gen-1] = 5.50 temp_best_value_gen = 5.00
130
131
        Yes, update solution and obj[gen] = 5.00
132
        solution chromosome =
133
          first level: [ [2. 8.]
134
          second level: [0. 1.]
135
          third level: [2. 3.]]
136
        The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
        obj[gen-1] = 5.00 temp_best_value_gen = 5.00
140
        No, maintain solution and obj[gen] = 5.00, and the tolerance_counter = 1
141
        solution chromosome =
142
          first level: [ [2. 8.]
143
          second level: [0.1.]
          third level: [2. 3.]]
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 = 2
150
        solution chromosome =
151
          first level: [ [2. 8.]
152
          second level: [0. 1.]
153
          third level: [2. 3.]]
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 = 3
159
        solution chromosome =
160
          first level: [ [2. 8.]
          second level: [0, 1,]
161
162
          third level: [2. 3.]]
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 = 4
168
        solution chromosome =
169
          first level: [ [2, 8.]
170
          second level: [0. 1.]
171
          third level: [2. 3.]]
172
        The No. 15 iteration is finished!
173
174 Beging the No. 16 iteration:
175
       obj[gen-1] = 5.00 temp_best_value_gen = 3.50
        Yes, update solution and obj[gen] = 3.50
176
177
       solution chromosome =
178
          first level: [ [2. 8.]
179
          second level: [0. 1.]
180
          third level: [4. 3.]]
181
        The No. 16 iteration is finished!
182
183 Beging the No. 17 iteration:
       obj[gen-1] = 3.50 temp_best_value_gen = 3.50
184
185
       No, maintain solution and obj[gen] = 3.50, and the tolerance_counter = 1
186
        solution chromosome =
187
          first level: [ [2. 8.]
          second level: [0. 1.]
188
          third level: [4. 3.]]
189
190
       The No. 17 iteration is finished!
191
192
     Beging the No. 18 iteration:
193
       obj[gen-1] = 3.50 temp_best_value_gen = 3.50
194
       No, maintain solution and obj[gen] = 3.50, and the tolerance counter = 2
195
       solution chromosome =
196
          first level: [ [2. 8.]
197
          second level: [0. 1.]
198
          third level: [4. 3.]]
199
       The No. 18 iteration is finished!
200
201 Beging the No. 19 iteration:
202
       obj[gen-1] = 3.50 temp_best_value_gen = 3.50
203
       No, maintain solution and obj[gen] = 3.50, and the tolerance_counter = 3
204
       solution chromosome =
205
          first level: [ [2. 8.]
206
          second level: [0. 1.]
207
          third level: [4. 3.]]
208
        The No. 19 iteration is finished!
209
210 Beging the No. 20 iteration:
211
       obj[gen-1] = 3.50 temp_best_value_gen = 3.50
212
       No, maintain solution and obj[gen] = 3.50, and the tolerance_counter = 4
       solution chromosome =
213
          first level: [ [2. 8.]
214
215
          second level: [0.1.]
216
          third level: [4. 3.]]
       The No. 20 iteration is finished!
217
218
219 Beging the No. 21 iteration:
       obj[gen-1] = 3.50 temp_best_value_gen = 3.50
220
221
       No, maintain solution and obj[gen] = 3.50, and the tolerance_counter = 5
222
       solution chromosome
223
          first level: [ [2. 8.]
224
          second level: [0. 1.]
225
          third level: [4. 3.]]
226
       The No. 21 iteration is finished!
227
228 Beging the No. 22 iteration:
229
       obj[gen-1] = 3.50 temp_best_value_gen = 3.50
230
       No, maintain solution and obj[gen] = 3.50, and the tolerance_counter = 6
231
       solution chromosome =
232
          first level: [ [2. 8.]
233
          second level: [0.1.]
234
          third level: [4. 3.]
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.]
242
          second level: [0.1.]
243
          third level: [4. 3.]]
244
        Objective function values and some other indicators:
                                Obj1 = 1.00
                                                      Obj0 + Obj1 = 3.00
245
          Obi0 = 2.00
          Total movement of crane: 0.00
246
247
          Total waiting time in berth position: 1.00
```

unkno									
248	Total	inde	ex of q du	ring bertl	hing: 42.00				
249 250	Specific V_id:	arra	angement	for each li: 4.0	vessel:	xi: 2.0 bow of i: 0.0	tail of i: 4.0	gama_i0: 0.0	gama_i1: 2.0
		·	duration	_time_i: 2 li: 8.0	2.0	demand i: 160.0	work load i: 160.0	work load gap_i: 0	
251	V_id:	1		li: 8.0	• 0	xi: 8.0 bow of i: 4.0	tail of i: 12.0	work load gap_i: 0 gama_i0: 1.0 work load gap_i: 0	gama_i1: 3.0
252			auration_	_time_i: 2	2.0	demand_i: 120.0	work load_i: 120.0	work load gap_1: 0	
253	Algorithm	finis	shed and	the total	CPU time:	193 s			
254	End								
255									