```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=30924
2
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_5_10 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 = 15
       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] = 23.91 temp_best_value_gen = 23.91
36
     The No. 0 iteration is finished!
37
38
39
   Beging the No. 1 iteration:
     obj[gen-1] = 23.91 temp_best_value_gen = 23.91
40
41
     No, maintain solution and obj[gen] = 23.91, and the tolerance_counter = 1
42
     solution chromosome =
43
       first level: [ [8.78 3.83 3.59 3.98 2.32]
       second level: [0. 2. 9. 4. 1.]
44
45
       third level: [8. 2. 5. 3. 4.]]
46
     The No. 1 iteration is finished!
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 23.91 temp_best_value_gen = 23.00
49
50
     Yes, update solution and obj[gen] = 23.00
51
     solution chromosome =
52
       first level: [ [ 4.5 11.5 26. 21.5 16.5]
53
       second level: [2. 0. 1. 6. 8.]
54
       third level: [2. 5. 4. 5. 2.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 23.00 temp best value gen = 23.00
59
     No, maintain solution and obj[gen] = 23.00, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [ 4.5 11.5 26. 21.5 16.5]
62
       second level: [2. 0. 1. 6. 8.]
63
       third level: [2. 5. 4. 5. 2.]]
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 23.00 temp\_best\_value\_gen = 23.00
68
     No, maintain solution and obj[gen] = 23.00, and the tolerance_counter = 2
69
     solution chromosome =
70
       first level: [ [ 4.5 11.5 26. 21.5 16.5]
71
       second level: [2. 0. 1. 6. 8.]
       third level: [2. 5. 4. 5. 2.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 23.00 temp best value gen = 23.00
76
     No, maintain solution and obj[gen] = 23.00, and the tolerance_counter = 3
77
78
     solution chromosome =
       first level: [ [ 4.5 11.5 26. 21.5 16.5]
```

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second level: [2. 0. 1. 6. 8.]
 80
 81
          third level: [2. 5. 4. 5. 2.]]
 82
       The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
       obj[gen-1] = 23.00 temp_best_value_gen = 23.00
No, maintain solution_and_obj[gen] = 23.00, and the tolerance_counter = 4
 85
 86
 87
        solution chromosome =
 88
          first level: [ [ 4.5 11.5 26. 21.5 16.5]
          second level: [2. 0. 1. 6. 8.]
 89
 90
          third level: [2. 5. 4. 5. 2.]]
 91
       The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
       obj[gen-1] = 23.00 temp_best_value_gen = 23.00
 94
 95
       No, maintain solution and obj[gen] = 23.00, and the tolerance_counter = 5
 96
       solution chromosome =
 97
          first level: [ [ 4.5 11.5 26. 21.5 16.5]
 98
          second level: [2. 0. 1. 6. 8.]
 99
          third level: [2. 5. 4. 5. 2.]]
100
       The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
       obj[gen-1] = 23.00 temp best value gen = 20.60
103
104
        Yes, update solution and obj[gen] = 20.60
105
       solution chromosome =
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
106
          second level: [2. 0. 1. 6. 8.]
107
108
          third level: [2. 5. 4. 5. 2.]]
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 20.60 temp\_best\_value\_gen = 20.60
113
       No, maintain solution and obj[gen] = 20.60, and the tolerance_counter = 1
       solution chromosome =
114
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
115
116
          second level: [2. 0. 1. 6. 8.]
          third level: [2, 5, 4, 5, 2,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 20.60 temp\_best\_value\_gen = 20.50
122
        Yes, update solution and obj[gen] = 20.50
123
       solution chromosome =
124
          first level: [ [ 4.5 21.5 16.5 11.5 26. ]
125
          second level: [2. 6. 5. 1. 8.]
126
          third level: [2. 5. 5. 4. 2.]]
127
       The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
        obj[gen-1] = 20.50 temp_best_value_gen = 20.50
130
131
       No, maintain solution and obj[gen] = 20.50, and the tolerance_counter = 1
132
       solution chromosome =
          first level: [ [ 4.5 21.5 16.5 11.5 26. ]
133
134
          second level: [2. 6. 5. 1. 8.]
135
          third level: [2. 5. 5. 4. 2.]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 20.50 temp_best_value_gen = 20.50
140
       No, maintain solution and obj[gen] = 20.50, and the tolerance_counter = 2
141
        solution chromosome =
142
          first level: [ [ 4.5 21.5 16.5 11.5 26. ]
143
          second level: [2. 6. 5. 1. 8.]
          third level: [2. 5. 5. 4. 2.]]
144
145
       The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
148
        obj[gen-1] = 20.50 temp_best_value_gen = 20.50
149
       No, maintain solution and obj[gen] = 20.50, and the tolerance_counter = 3
150
       solution chromosome =
151
          first level: [ [ 4.5 21.5 16.5 11.5 26. ]
152
          second level: [2. 6. 5. 1. 8.]
153
          third level: [2. 5. 5. 4. 2.]]
154
       The No. 13 iteration is finished!
155
156 Beging the No. 14 iteration:
157
       obj[gen-1] = 20.50 temp_best_value_gen = 20.50
158
       No, maintain solution and obj[gen] = 20.50, and the tolerance_counter = 4
159
        solution chromosome =
160
          first level: [ [ 4.5 21.5 16.5 11.5 26. ]
          second level: [2. 6. 5. 1. 8.]
161
          third level: [2. 5. 5. 4. 2.]]
162
        The No. 14 iteration is finished!
163
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164
165 Beging the No. 15 iteration:
        obj[gen-1] = 20.50 temp_best_value_gen = 19.50
166
167
        Yes, update solution and obj[gen] = 19.50
168
        solution chromosome =
169
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
          second level: [2. 0. 1. 1. 8.]
170
171
          third level: [2. 5. 4. 4. 2.]]
172
        The No. 15 iteration is finished!
173
174
     Beging the No. 16 iteration:
175
        obj[gen-1] = 19.50 temp_best_value_gen = 19.50
176
        No, maintain solution and obj[gen] = 19.50, and the tolerance_counter = 1
177
        solution chromosome =
178
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
179
          second level: [2. 0. 1. 1. 8.]
          third level: [2. 5. 4. 4. 2.]]
180
181
        The No. 16 iteration is finished!
182
183
     Beging the No. 17 iteration:
        obj[gen-1] = 19.50 temp_best_value_gen = 19.50
184
185
        No, maintain solution and obj[gen] = 19.50, and the tolerance_counter = 2
186
        solution chromosome =
187
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
188
          second level: [2. 0. 1. 1. 8.]
189
          third level: [2. 5. 4. 4. 2.]]
190
        The No. 17 iteration is finished!
191
192
     Beging the No. 18 iteration:
193
        obj[gen-1] = 19.50 temp_best_value_gen = 19.50
194
        No, maintain solution and obj[gen] = 19.50, and the tolerance counter = 3
195
        solution chromosome =
196
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
197
          second level: [2. 0. 1. 1. 8.]
198
          third level: [2. 5. 4. 4. 2.]]
199
        The No. 18 iteration is finished!
200
201 Beging the No. 19 iteration:
202
        obj[gen-1] = 19.50 temp_best_value_gen = 19.50
203
        No, maintain solution and obj[gen] = 19.50, and the tolerance_counter = 4
204
        solution chromosome =
205
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
          second level: [2. 0. 1. 1. 8.]
206
207
          third level: [2. 5. 4. 4. 2.]]
208
        The No. 19 iteration is finished!
209
210 Beging the No. 20 iteration:
211
        obj[gen-1] = 19.50 temp_best_value_gen = 19.50
212
        No, maintain solution and obj[gen] = 19.50, and the tolerance_counter = 5
213
        solution chromosome =
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
214
215
          second level: [2. 0. 1. 1. 8.]
216
          third level: [2. 5. 4. 4. 2.]]
217
        The No. 20 iteration is finished!
218
219 Beging the No. 21 iteration:
        obj[gen-1] = 19.50 temp best value gen = 19.50
220
221
        No, maintain solution and obj[gen] = 19.50, and the tolerance_counter = 6
222
        solution chromosome
223
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
224
          second level: [2. 0. 1. 1. 8.]
225
          third level: [2. 5. 4. 4. 2.]]
226
        The No. 21 iteration is finished!
227
228
229
230 The iteration is terminated and then visulize the solution:
231
        solution chromosome =
          first level: [ [ 4.5 11.5 16.5 21.5 26. ]
232
233
          second level: [2. 0. 1. 1. 8.]
234
          third level: [2. 5. 4. 4. 2.]]
235
        Objective function values and some other indicators:
                                Obj1 = 24.00
236
          Obj0 = 9.00
                                                       Obj0 + Obj1 = 33.00
237
          Total movement of crane: 12.00
238
          Total waiting time in berth position: 12.00
239
          Total index of q during berthing: 507.00
240
        Specific arrangement for each vessel:
241
           V_id: 0
                              1i: 9.0
                                                  xi: 4.5
                                                                      bow of i: 0.0
                                                                                                 tail of i: 9.0
                                                                                                                          gama i0: 2.0
                                                                                                                                                      gama_i1: 5.0
                                                                                     work load_i: 100.0
                    duration_time_i: 3.0
                                                       demand i: 100.0
                                                                                                                      work load gap_i: 0
                                                                                                                               gama_i0: 0.0
242
           V id: 1
                              li: 5.0
                                                                         bow of i: 9.0
                                                                                                    tail of i: 14.0
                                                                                                                                                           gama_i1: 1
     .0
                       duration time i: 1.0
                                                         demand i: 60.0
                                                                                        work load i: 60.0
                                                                                                                        work load gap i: 0
243
           V id: 2
                                                                        bow of i: 14.0
                                                                                                    tail of i: 19.0
                                                                                                                               gama i0: 1.0
                              li: 5.0
                                                  xi: 16.5
                                                                                                                                                           gama i1:4
                       duration_time_i: 3.0
                                                          demand_i: 240.0
                                                                                       work load_i: 240.0
     .0
                                                                                                                        work load gap_i: 0
244
           V id: 3
                              li: 5.0
                                                  xi: 21.5
                                                                         bow of i: 19.0
                                                                                                    tail of i: 24.0
                                                                                                                               gama_i0: 1.0
                                                                                                                                                           gama_i1: 4
```

unknown

244	.0	duration_time_i: 3.0 li: 4.0	dema	nd_i: 220.0	work load_i: 220.0 tail of i: 28.0	work load gap_i: 0		
245	V_id: 4 10.0	li: 4.0 duration_time_i: 2.0	xi: 26.0 de	bow of i: 24.0 mand_i: 60.0	tail of i: 28.0 work load_i: 60.0	work load gap_i: 0 gama_i0: 8.0 work load gap_i: 0	gama_i1:	
246		Algorithm finished and the total CPU time: 1251 s						
248	End	agorium missied and the total CPO time. 1251 s End						
249								