```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=42731
 3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   01 My Python Code', 'E:/1 0000/3 00000/1 000000/1 0000000/1 000000 0000/1 LW 00002/6 0000/2 python code/
   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
   □□□/2 python code/01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
   Waiting 1s.....
12
13
   This is the R_6_1 _standard_test.xlsx optimization process.
14
15
   Start
     Read basic data
16
17
       V = 6
18
       T = 36
       Q = 23
19
       L = 30
20
21
     PSO parameter setting:
       Trail = 25
23
       maxIter num = 10
24
       W inertia = 1.0
25
       oder_type_num = 20
26
       c1 = 2.5
       c2 = 2.0
27
28
       r1 = 0.16867453276772626
29
       r2 = 0.16867453276772626
30 Begin iteration:
31
32
   iter = 0
33
       cord individul obj[indivial i, :] = [0.6.64.70.]
34
       cord_individul_obj[indivial_i, :] = [1. 5. 32. 37.]
       cord_individul_obj[indivial_i, :] = [ 2. 6. 42. 48.]
35
36
       cord_individul_obj[indivial_i, :] = [3. 6. 38. 44.]
37
       cord_individul_obj[indivial_i, :] = [ 4. 6. 80. 86.]
       cord_individul_obj[indivial_i, :] = [ 5. 4. 136. 140.]
38
39
       cord_individul_obj[indivial_i, :] = [6. 5. 68. 73.]
40
       cord_individul_obj[indivial_i, :] = [7. 6. 36. 42.]
       cord_individul_obj[indivial_i, :] = [ 8. 4. 162. 166.]
41
       cord_individul_obj[indivial_i, :] = [9. 5. 44. 49.]
42
43
       cord_individul_obj[indivial_i, :] = [10. 4. 18. 22.]
       cord_individul_obj[indivial_i, :] = [11. 4. 40. 44.]
44
       cord_individul_obj[indivial_i, :] = [12. 5. 44. 49.]
45
46
       cord_individul_obj[indivial_i, :] = [13. 5. 38. 43.]
       cord_individul_obj[indivial_i, :] = [14. 5. 22. 27.]
47
48
       cord_individul_obj[indivial_i, :] = [15. 3. 18. 21.]
       cord_individul_obj[indivial_i, :] = [ 16. 4. 128. 132.]
49
50
       cord_individul_obj[indivial_i, :] = [ 17. 5. 118. 123.]
       cord individul obi[indivial i, :] = [18. 4. 84. 88.]
51
       cord individul obj[indivial i, :] = [19. 4. 26. 30.]
52
53
54
     min(cord\_individul\_obj[:, 3]) = 21.0
55
     historl G best iter[iter, 3] = 21.0
   Begin iteration:
56
57
58
   iter = 1
       cord\_individul\_obj[indivial\_i, :] = [0.5.32.37.]
59
       cord_individul_obj[indivial_i, :] = [ 1. 5. 54. 59.]
60
61
       cord_individul_obj[indivial_i, :] = [ 2. 6. 8. 14.]
62
       cord_individul_obj[indivial_i, :] = [3. 6. 8. 14.]
       cord_individul_obj[indivial_i, :] = [4. 6. 68. 74.]
63
       cord_individul_obj[indivial_i, :] = [5. 4. 44. 48.]
64
65
       cord_individul_obj[indivial_i, :] = [6. 3. 52. 55.]
       cord_individul_obj[indivial_i, :] = [7. 6. 8. 14.]
66
67
       cord_individul_obj[indivial_i, :] = [8. 3. 18. 21.]
68
       cord_individul_obj[indivial_i, :] = [9. 5. 44. 49.]
       cord_individul_obj[indivial_i, :] = [10. 5. 40. 45.]
69
70
       cord_individul_obj[indivial_i, :] = [11. 5. 44. 49.]
71
       cord_individul_obj[indivial_i, :] = [12. 5. 44. 49.]
       cord_individul_obj[indivial_i, :] = [13. 4. 44. 48.]
       cord_individul_obj[indivial_i, :] = [14. 5. 26. 31.] cord_individul_obj[indivial_i, :] = [15. 3. 44. 47.]
73
74
75
       cord_individul_obj[indivial_i, :] = [16. 5. 38. 43.]
76
       cord individul obj[indivial i, :] = [17. 3. 92. 95.]
       cord individul obj[indivial i, :] = [18. 6. 24. 30.]
77
78
       cord_individul_obj[indivial_i, :] = [19. 4. 20. 24.]
79
```

```
min(cord_individul_obj[:, 3]) = 14.0
 81
       historl_G_best_iter[iter, 3] = 14.0
     Begin iteration:
 82
 83
 84 iter = 2
 85
          cord\_individul\_obj[indivial\_i,:] = [\ 0.\ \ 6.\ 24.\ 30.]
          cord_individul_obj[indivial_i, :] = [ 1. 4. 8. 12.]
 86
 87
          cord_individul_obj[indivial_i, :] = [ 2. 4. 18. 22.]
 88
          cord\_individul\_obj[indivial\_i, :] = [3. 6. 24. 30.]
 89
          cord_individul_obj[indivial_i, :] = [4. 6. 18. 24.]
 90
          cord_individul_obj[indivial_i, :] = [5. 6. 8. 14.]
 91
          cord_individul_obj[indivial_i, :] = [6. 6. 8. 14.]
 92
          cord individul obj[indivial i, :] = [7. 4.24.28.]
 93
          cord_individul_obj[indivial_i, :] = [ 8. 6. 24. 30.]
 94
          cord_individul_obj[indivial_i, :] = [ 9. 6. 18. 24.]
          cord_individul_obj[indivial_i, :] = [10. 6. 28. 34.]
 95
 96
          cord_individul_obj[indivial_i, :] = [11. 6. 44. 50.]
 97
          cord_individul_obj[indivial_i, :] = [12. 5. 24. 29.]
 98
          cord_individul_obj[indivial_i, :] = [13. 4. 8. 12.]
 99
          cord_individul_obj[indivial_i, :] = [14. 6. 18. 24.]
100
          cord_individul_obj[indivial_i, :] = [15. 6. 18. 24.]
101
          cord_individul_obj[indivial_i, :] = [16, 6, 30, 36]
102
          cord_individul_obj[indivial_i, :] = [17. 6. 8. 14.]
103
          cord individul obj[indivial i, :] = [18. 6. 8. 14.]
104
          cord_individul_obj[indivial_i, :] = [19. 4. 8. 12.]
105
106
       min(cord\ individul\ obj[:, 3]) = 12.0
107
       historl\_G\_best\_iter[iter, 3] = 12.0
108 Begin iteration:
109
110 iter = 3
          cord_individul_obj[indivial_i, :] = [ 0. 5. 104. 109.]
111
112
          cord_individul_obj[indivial_i, :] = [ 1. 4. 132. 136.]
          cord_individul_obj[indivial_i, :] = [2. 3. 84. 87.]
113
114
          cord_individul_obj[indivial_i, :] = [3. 4. 72. 76.]
115
          cord_individul_obj[indivial_i, :] = [ 4. 4. 104. 108.]
116
          cord_individul_obj[indivial_i, :] = [ 5. 4. 122. 126.]
          cord_individul_obj[indivial_i, :] = [6. 5. 74. 79.]
117
118
          cord_individul_obj[indivial_i, :] = [7. 4. 72. 76.]
119
          cord_individul_obj[indivial_i, :] = [ 8. 5. 52. 57.]
120
          cord_individul_obj[indivial_i, :] = [ 9. 4. 124. 128.]
121
          cord\_individul\_obj[indivial\_i, :] = [10. 5. 64. 69.]
          cord\_individul\_obj[indivial\_i, :] = [11. 4. 8. 12.]
122
123
          cord_individul_obj[indivial_i, :] = [12, 3, 72, 75]
124
          cord_individul_obj[indivial_i, :] = [13. 4. 84. 88.]
          cord_individul_obj[indivial_i, :] = [14, 4, 44, 48]
125
126
          cord_individul_obj[indivial_i, :] = [15, 4, 30, 34]
127
          cord_individul_obj[indivial_i, :] = [16. 6. 44. 50.]
128
          cord_individul_obj[indivial_i, :] = [ 17. 4. 154. 158.]
129
          130
          cord_individul_obj[indivial_i, :] = [19. 4. 78. 82.]
131
132
       min(cord\_individul\_obj[:, 3]) = 12.0
       historl\_G\_best\_iter[iter, 3] = 12.0
133
134 Begin iteration:
135
136 iter = 4
137
          cord_individul_obj[indivial_i, :] = [0. 5. 72. 77.]
138
          cord_individul_obj[indivial_i, :] = [ 1. 4. 92. 96.]
          cord_individul_obj[indivial_i, :] = [ 2. 3. 80. 83.]
139
140
          cord_individul_obj[indivial_i, :] = [3, 4, 24, 28]
141
          cord_individul_obj[indivial_i, :] = [ 4. 4. 80. 84.]
          cord individul obj[indivial i, :] = [5. 4.30.34.]
142
143
          cord_individul_obj[indivial_i, :] = [6. 5. 88. 93.]
144
          cord_individul_obj[indivial_i, :] = [7. 4. 54. 58.]
145
          cord_individul_obj[indivial_i, :] = [8. 5. 62. 67.]
          cord_individul_obj[indivial_i, :] = [9. 4. 90. 94.]
146
147
          cord_individul_obj[indivial_i, :] = [ 10. 5. 108. 113.]
148
          cord_individul_obj[indivial_i, :] = [ 11. 5. 182. 187.]
149
          cord_individul_obj[indivial_i, :] = [12. 5. 72. 77.]
150
          cord_individul_obj[indivial_i, :] = [13. 3. 90. 93.]
151
          cord_individul_obj[indivial_i, :] = [14. 5. 80. 85.]
152
          cord_individul_obj[indivial_i, :] = [15. 4. 54. 58.]
          cord_individul_obj[indivial_i, :] = [16. 6. 24. 30.]
153
154
          cord\_individul\_obj[indivial\_i, :] = [17. 4. 8. 12.]
155
          cord_individul_obj[indivial_i, :] = [ 18. 5. 136. 141.]
156
          cord_individul_obj[indivial_i, :] = [19. 4. 74. 78.]
157
158
       min(cord\_individul\_obj[:, 3]) = 12.0
159
       historl\_G\_best\_iter[iter, 3] = 12.0
160 Begin iteration:
161
162
     iter = 5
          cord_individul_obj[indivial_i, :] = [ 0. 5. 56. 61.]
163
```

```
164
           cord_individul_obj[indivial_i, :] = [ 1. 4. 84. 88.]
165
          cord individul obj[indivial i, :] = [2. 3. 84. 87.]
          cord_individul_obj[indivial_i, :] = [3. 4. 54. 58.]
166
167
          cord_individul_obj[indivial_i, :] = [4. 5. 80. 85.]
168
          cord_individul_iobj[indivial_i, :] = [5. 4. 54. 58.]
169
          cord_individul_obj[indivial_i, :] = [6. 5. 88. 93.]
170
          cord_individul_obj[indivial_i, :] = [7. 4. 54. 58.]
171
          cord_individul_obj[indivial_i, :] = [ 8. 5. 72. 77.]
172
          cord_individul_obj[indivial_i, :] = [ 9. 4. 78. 82.]
          cord_individul_obj[indivial_i, :] = [ 10. 5. 104. 109.]
173
          cord\_individul\_obj[indivial\_i,:] = \ [11.\ 4.\ 8.\ 12.]
174
175
          cord_individul_obj[indivial_i, :] = [12. 4. 72. 76.]
          cord individul obj[indivial_i, :] = [13. 6. 44. 50.]
176
177
          cord_individul_obj[indivial_i, :] = [ 14.  3. 104. 107.]
178
          cord_individul_obj[indivial_i, :] = [15. 4. 72. 76.]
179
          cord_individul_obj[indivial_i, :] = [ 16. 5. 96. 101.]
180
          cord_individul_obj[indivial_i, :] = [17. 4. 86. 90.]
          cord_individul_obj[indivial_i, :] = [18. 4. 86. 90.]
181
182
          cord_individul_obj[indivial_i, :] = [19. 4. 68. 72.]
183
184
        min(cord_individul_obj[:, 3]) = 12.0
185
        historl\_G\_best\_iter[iter, 3] = 12.0
186
     Begin iteration:
187
188 iter = 6
189
          cord_individul_obj[indivial_i, :] = [ 0. 4. 108. 112.]
          cord individul obj[indivial i, :] = [1. 4. 24. 28.]
190
191
          cord\_individul\_obj[indivial\_i, :] = [2. 4. 8. 12.]
192
          cord_individul_obj[indivial_i, :] = [3. 4. 70. 74.]
193
          cord_individul_obj[indivial_i, :] = [4. 4. 8. 12.]
194
          cord individul obj[indivial i, :] = [5. 4.114.118.]
          cord_individul_obj[indivial_i, :] = [ 6. 4. 18. 22.]
195
196
          cord_individul_obj[indivial_i, :] = [7. 4. 50. 54.]
197
          cord_individul_obj[indivial_i, :] = [ 8. 4. 54. 58.]
198
          cord individul obj[indivial i, :] = [9. 4. 8. 12.]
199
          cord_individul_obj[indivial_i, :] = [10. 4. 8. 12.]
200
          cord_individul_obj[indivial_i, :] = [ 11. 5. 104. 109.]
          cord individul obi[indivial i, :] = [12. 5. 8. 13.]
201
202
          cord_individul_obj[indivial_i, :] = [13. 4. 30. 34.]
203
          cord_individul_obj[indivial_i, :] = [14. 5. 8. 13.]
204
          cord_individul_obj[indivial_i, :] = [15. 4. 8. 12.]
          cord individul_obj[indivial_i, :] = [16. 5. 12. 17.]
205
          cord_individul_obj[indivial_i, :] = [17. 4. 12. 16.]
206
207
          cord_individul_obj[indivial_i, :] = [18. 5. 40. 45.]
208
          cord_individul_obj[indivial_i, :] = [19. 4. 8. 12.]
209
210
        min(cord\_individul\_obj[:, 3]) = 12.0
211
        historl\_G\_best\_iter[iter, 3] = 12.0
212 Begin iteration:
213
214 \text{ iter} = 7
215
          cord_individul_obj[indivial_i, :] = [0. 4. 64. 68.]
216
          cord_individul_obj[indivial_i, :] = [1. 4. 52. 56.]
          cord_individul_obj[indivial_i, :] = [ 2. 4. 48. 52.]
217
218
          cord_individul_obj[indivial_i, :] = [3. 4. 32. 36.]
219
          cord_individul_obj[indivial_i, :] = [ 4. 5. 52. 57.]
          cord individul obj[indivial i, :] = [5. 4. 8. 12.]
220
221
          cord_individul_obj[indivial_i, :] = [6. 4. 32. 36.]
222
          cord_individul_obj[indivial_i, :] = [7. 4. 54. 58.]
          cord_individul_obj[indivial_i, :] = [8. 4. 86. 90.]
223
224
          cord_individul_obj[indivial_i, :] = [9, 4, 16, 20]
225
          cord_individul_obj[indivial_i, :] = [10. 5. 84. 89.]
226
          cord individul obj[indivial i, :] = [11. 4. 24. 28.]
227
          cord\_individul\_obj[indivial\_i, :] = [12. 5.112.117.]
228
          cord_individul_obj[indivial_i, :] = [13. 4. 38. 42.]
229
          cord_individul_obj[indivial_i, :] = [14. 5. 44. 49.]
230
          cord_individul_obj[indivial_i, :] = [15. 4. 72. 76.]
          cord_individul_obj[indivial_i, :] = [16. 5. 28. 33.]
231
          cord_individul_obj[indivial_i, :] = [17. 4. 76. 80.]
232
233
          cord_individul_obj[indivial_i, :] = [18. 5. 42. 47.]
234
          cord_individul_obj[indivial_i, :] = [19. 4. 24. 28.]
235
236
        min(cord\_individul\_obj[:, 3]) = 12.0
237
        historl G best iter[iter, 3] = 12.0
238 Begin iteration:
239
240 \text{ iter} = 8
241
          cord_individul_obj[indivial_i, :] = [0. 5. 48. 53.]
          cord_individul_obj[indivial_i, :] = [ 1. 4. 88. 92.]
242
243
          cord_individul_obj[indivial_i, :] = [ 2. 4. 52. 56.]
244
          cord individul obj[indivial i, :] = [3. 4.72.76.]
          cord_individul_obj[indivial_i, :] = [ 4. 5. 84. 89.]
245
246
          cord_individul_obj[indivial_i, :] = [5. 4. 48. 52.]
          cord_individul_obj[indivial_i, :] = [6. 5. 52. 57.]
247
```

```
248
          cord_individul_obj[indivial_i, :] = [7. 3.48.51.]
249
          cord individul obj[indivial i, :] = [8.5, 52, 57.]
          cord_individul_obj[indivial_i, :] = [ 9. 4. 30. 34.]
250
251
          cord_individul_obj[indivial_i, :] = [10. 4. 52. 56.]
252
          cord_individul_obj[indivial_i, :] = [11. 6. 48. 54.]
253
          cord_individul_obj[indivial_i, :] = [12. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [13. 3. 84. 87.]
254
255
          cord_individul_obj[indivial_i, :] = [14. 4. 48. 52.]
256
          cord individul obj[indivial i, :] = [15. 4. 30. 34.]
          cord individul obj[indivial i, :] = [16. 5. 48. 53.]
257
258
          cord_individul_obj[indivial_i, :] = [17. 4. 84. 88.]
259
          cord_individul_obj[indivial_i, :] = [18. 4. 78. 82.]
          cord individul obj[indivial i, :] = [19. 4. 64. 68.]
260
261
262
        min(cord_individul_obj[:, 3]) = 12.0
        historl_G_best_iter[iter, 3] = 12.0
263
264
     Begin iteration:
265
266 \text{ iter} = 9
267
          cord individul obj[indivial i, :] = [0.5, 24, 29]
268
          cord_individul_obj[indivial_i, :] = [ 1. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [ 2. 6. 48. 54.]
269
270
          cord_individul_obj[indivial_i, :] = [3. 4. 28. 32.]
          cord individul obj[indivial i, :] = [4. 4. 48. 52.]
271
          cord_individul_obj[indivial_i, :] = [5. 4. 12. 16.]
272
273
          cord_individul_obj[indivial_i, :] = [6. 5. 18. 23.]
          cord individul obj[indivial i, :] = [7. 4.30.34.]
274
          cord_individul_obj[indivial_i, :] = [ 8. 5. 56. 61.]
275
          cord_individul_obj[indivial_i, :] = [ 9. 4. 18. 22.]
276
          cord_individul_obj[indivial_i, :] = [10. 5. 48. 53.]
277
278
          cord_individul_obj[indivial_i, :] = [11. 5. 52. 57.]
279
          cord individul obj[indivial i, :] = [12. 5. 56. 61.]
280
          cord_individul_obj[indivial_i, :] = [13. 3. 28. 31.]
281
          cord_individul_obj[indivial_i, :] = [14. 5. 48. 53.]
          cord individul obj[indivial i, :] = [15. 4. 12. 16.]
282
283
          cord_individul_obj[indivial_i, :] = [16. 4. 48. 52.]
284
          cord_individul_obj[indivial_i, :] = [17. 4. 78. 82.]
          cord individul obi[indivial i, :] = [18. 5. 78. 83.]
285
286
          cord_individul_obj[indivial_i, :] = [19. 4. 18. 22.]
287
288
        min(cord\_individul\_obj[:, 3]) = 12.0
289
        historl G best iter[iter, 3] = 12.0
290 Begin iteration:
291
292
     iter = 10
293
          cord_individul_obj[indivial_i, :] = [ 0. 5. 48. 53.]
          cord_individul_obj[indivial_i, :] = [1. 4. 48. 52.]
294
295
          cord_individul_obj[indivial_i, :] = [2. 4. 48. 52.]
296
          cord individul obj[indivial i, :] = [3. 4.28.32.]
297
          cord_individul_obj[indivial_i, :] = [4. 5. 78. 83.]
          cord individul obj[indivial i, :] = [5. 4.36.40.]
298
299
          cord_individul_obj[indivial_i, :] = [6. 5. 28. 33.]
          cord_individul_obj[indivial_i, :] = [ 7. 4. 28. 32.]
300
          cord_individul_obj[indivial_i, :] = [ 8. 5. 66. 71.]
301
302
          cord_individul_obj[indivial_i, :] = [9. 4. 40. 44.]
          cord individul obi[indivial i, :] = [10.5.48.53.]
303
          cord individul obj[indivial i, :] = [11. 5. 70. 75.]
304
          cord_individul_obj[indivial_i, :] = [12. 4. 40. 44.]
305
306
          cord_individul_obj[indivial_i, :] = [13. 3. 48. 51.]
          cord individul obi[indivial i, :] = [14, 3, 48, 51.]
307
          cord_individul_obj[indivial_i, :] = [15. 4. 28. 32.]
308
          cord_individul_obj[indivial_i, :] = [16. 5. 66. 71.]
309
310
          cord individul obj[indivial i, :] = [17. 4.58.62.]
311
          cord_individul_obj[indivial_i, :] = [18. 4. 8. 12.]
          cord_individul_obj[indivial_i, :] = [19. 4. 30. 34.]
312
313
314
        min(cord\ individul\ obj[:, 3]) = 12.0
315
        historl G best iter[iter, 3] = 12.0
316 Iteration calculate over
317
318
319
320
321 All item are in Bin and:
        Bin area = 1080
322
323
        Real area = 99.0
324
        Proportion_of_area = 0.09166666666666666
325
          BEST CHROM =
326
             berth: [20.5 26. 6. 11.5 1.5 16.]
327
             time: [0. 0. 0. 0. 0. 0.]
328
             num QC: [2. 2. 4. 4. 2. 3.]
329
        Objective function values and some other indicators:
330
                                                        Obj0 + Obj1 = 12.00
          Obi0 = 4.00
                                 Obj1 = 8.00
          Total movement of crane: 8.00
331
```

	0 1111						
332							
333	Total index of q during berthing: 471.00						
334	334 Specific arrangement for each vessel:						
335	V_id: 0	li: 5.0	xi: 20.5	bow of i: 18.0		gama_i0: 0.0	gama_i1: 1
	.0	gama_i1 + 1: 2.0	gama_i1 -	gama_i0: 1.0	duration_time_i: 2.0	demand_i: 80.0	work
	load_i: 80.0	gama_i1 + 1: 2.0 gama_i1 - gama_i0: 1.0 ad_i: 80.0 work load gap_i: 0					
336	V_id: 1	li: 6.0	xi: 26.0	bow of i: 23.0	tail of i: 29.0	gama_i0: 0.0	gama_i1: 2
	.0	gama_i1 + 1: 3.0	gama_i1 -	gama_i0: 2.0	duration_time_i: 3.0	demand_i: 120.0	work
	load_i: 120.0 work load gap_i: 0 7 V_id: 2 li: 6.0 xi: 6.0 bow of i: 3.0						
			xi: 6.0	bow of i: 3.0		gama_i0: 0.0	gama_i1: 3.0
		gama_i1 + 1: 4.0	gama_i1 - gar	ma_i0: 3.0	duration_time_i: 4.0	demand_i: 260.0	work load_i:
	260.0	gama_i1 + 1: 4.0 work load gap_i: 0					
338	V_id: 3	li: 5.0	xi: 11.5	bow of i: 9.0	tail of i: 14.0	gama_i0: 0.0	gama_i1: 0
	.0	gama_i1 + 1: 1.0	gama_i1 -	gama_i0: 0.0	duration_time_i: 1.0	demand_i: 80.0	work
339	V_id: 4			bow of i: 0.0		gama_i0: 0.0	
		gama_i1 + 1: 5.0	gama_i1 - gar	ma_i0: 4.0	duration_time_i: 5.0	demand_i: 200.0	work load_i:
	200.0	work load gap_i: 0					
						gama_i0: 0.0	gama_i1: 3
				gama_10: 3.0	duration_time_i: 4.0	demand_1: 220.0	work
241	load_i: 220.0 work load gap_i: 0						
341	AL SECTION AND ADDRESS TO						
	Algorithm finished and the total CPU time: 79 s						
	End						
344							