

```
1 "E:\1\3\1\1\1\1\1\1\1_LW_2\6\2 python code\01_My_Python_Code\Scripts\python.exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=17777
2
3 import sys; print('Python %s on %s' % (sys.version, sys.platform))
4 sys.path.extend(['E:\1\3\1\1\1\1\1_LW_2\6\2 python code\01_My_Python_Code\main_BACASP_offical_PSO_2D_Bin_berth_line.py', wdir='E:/1\3\1\1\1\1\1_LW_2\6\2 python code\01_My_Python_Code'])
5
6 PyDev console: starting.
7
8 Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
9 >>> runfile('E:/1\3\1\1\1\1_LW_2\6\2 python code\01_My_Python_Code/main_BACASP_offical_PSO_2D_Bin_berth_line.py', wdir='E:/1\3\1\1\1\1\1_LW_2\6\2 python code\01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
11 Waiting 1s.....
12
13 This is the R_6_1_standerd_test.xlsx optimization process.
14
15 Start
16   Read basic data
17     V = 6
18     T = 36
19     Q = 23
20     L = 30
21   PSO parameter setting:
22     maxIter_num = 40
23     W_inertia = 1.5
24     oder_type_num = 10
25     c1 = 2.5
26     c2 = 1.5
27     r1 = 0.5326160504112535
28     r2 = 0.5326160504112535
29 Begin iteration:
30
31 iter = 0
32   cord_individual_obj[individual_i, :] = [ 0.  6. 44. 50.]
33   cord_individual_obj[individual_i, :] = [ 1.  4. 56. 60.]
34   cord_individual_obj[individual_i, :] = [ 2.  6. 18. 24.]
35   cord_individual_obj[individual_i, :] = [ 3.  5. 22. 27.]
36   cord_individual_obj[individual_i, :] = [ 4.  5. 28. 33.]
37   cord_individual_obj[individual_i, :] = [ 5.  5. 50. 55.]
38   cord_individual_obj[individual_i, :] = [ 6.  4. 38. 42.]
39   cord_individual_obj[individual_i, :] = [ 7.  5. 46. 51.]
40   cord_individual_obj[individual_i, :] = [ 8.  4. 24. 28.]
41   cord_individual_obj[individual_i, :] = [ 9.  4. 38. 42.]
42
43 min(cord_individual_obj[:, 3]) = 24.0
44 historl_G_best_iter[iter, 3] = 24.0
45 Begin iteration:
46
47 iter = 1
48   cord_individual_obj[individual_i, :] = [ 0.  6. 68. 74.]
49   cord_individual_obj[individual_i, :] = [ 1.  6. 18. 24.]
50   cord_individual_obj[individual_i, :] = [ 2.  6. 16. 22.]
51   cord_individual_obj[individual_i, :] = [ 3.  5. 18. 23.]
52   cord_individual_obj[individual_i, :] = [ 4.  6. 44. 50.]
53   cord_individual_obj[individual_i, :] = [ 5.  6. 84. 90.]
54   cord_individual_obj[individual_i, :] = [ 6.  5. 24. 29.]
55   cord_individual_obj[individual_i, :] = [ 7.  5. 84. 89.]
56   cord_individual_obj[individual_i, :] = [ 8.  6. 18. 24.]
57   cord_individual_obj[individual_i, :] = [ 9.  4. 90. 94.]
58
59 min(cord_individual_obj[:, 3]) = 22.0
60 historl_G_best_iter[iter, 3] = 22.0
61 Begin iteration:
62
63 iter = 2
64   cord_individual_obj[individual_i, :] = [ 0.  6. 38. 44.]
65   cord_individual_obj[individual_i, :] = [ 1.  4. 38. 42.]
66   cord_individual_obj[individual_i, :] = [ 2.  6. 16. 22.]
67   cord_individual_obj[individual_i, :] = [ 3.  5. 28. 33.]
68   cord_individual_obj[individual_i, :] = [ 4.  6. 88. 94.]
69   cord_individual_obj[individual_i, :] = [ 5.  4. 46. 50.]
70   cord_individual_obj[individual_i, :] = [ 6.  5. 38. 43.]
71   cord_individual_obj[individual_i, :] = [ 7.  6. 48. 54.]
72   cord_individual_obj[individual_i, :] = [ 8.  4. 28. 32.]
73   cord_individual_obj[individual_i, :] = [ 9.  6. 16. 22.]
74
75 min(cord_individual_obj[:, 3]) = 22.0
76 historl_G_best_iter[iter, 3] = 22.0
77 Begin iteration:
78
79 iter = 3
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80  cord_individual_obj[indivial_i,:] = [ 0. 6. 34. 40.]
81  cord_individual_obj[indivial_i,:] = [ 1. 5. 48. 53.]
82  cord_individual_obj[indivial_i,:] = [ 2. 6. 8. 14.]
83  cord_individual_obj[indivial_i,:] = [ 3. 6. 14. 20.]
84  cord_individual_obj[indivial_i,:] = [ 4. 6. 16. 22.]
85  cord_individual_obj[indivial_i,:] = [ 5. 6. 16. 22.]
86  cord_individual_obj[indivial_i,:] = [ 6. 6. 34. 40.]
87  cord_individual_obj[indivial_i,:] = [ 7. 6. 28. 34.]
88  cord_individual_obj[indivial_i,:] = [ 8. 5. 62. 67.]
89  cord_individual_obj[indivial_i,:] = [ 9. 6. 24. 30.]
90
91 min(cord_individual_obj[:,3]) = 14.0
92 historl_G_best_iter[iter,3] = 14.0
93 Begin iteration:
94
95 iter = 4
96  cord_individual_obj[indivial_i,:] = [ 0. 5. 48. 53.]
97  cord_individual_obj[indivial_i,:] = [ 1. 6. 60. 66.]
98  cord_individual_obj[indivial_i,:] = [ 2. 6. 28. 34.]
99  cord_individual_obj[indivial_i,:] = [ 3. 5. 28. 33.]
100 cord_individual_obj[indivial_i,:] = [ 4. 6. 64. 70.]
101 cord_individual_obj[indivial_i,:] = [ 5. 5. 52. 57.]
102 cord_individual_obj[indivial_i,:] = [ 6. 4. 34. 38.]
103 cord_individual_obj[indivial_i,:] = [ 7. 6. 54. 60.]
104 cord_individual_obj[indivial_i,:] = [ 8. 6. 8. 14.]
105 cord_individual_obj[indivial_i,:] = [ 9. 6. 38. 44.]
106
107 min(cord_individual_obj[:,3]) = 14.0
108 historl_G_best_iter[iter,3] = 14.0
109 Begin iteration:
110
111 iter = 5
112  cord_individual_obj[indivial_i,:] = [ 0. 4. 44. 48.]
113  cord_individual_obj[indivial_i,:] = [ 1. 5. 28. 33.]
114  cord_individual_obj[indivial_i,:] = [ 2. 6. 60. 66.]
115  cord_individual_obj[indivial_i,:] = [ 3. 6. 28. 34.]
116  cord_individual_obj[indivial_i,:] = [ 4. 6. 8. 14.]
117  cord_individual_obj[indivial_i,:] = [ 5. 4. 50. 54.]
118  cord_individual_obj[indivial_i,:] = [ 6. 6. 34. 40.]
119  cord_individual_obj[indivial_i,:] = [ 7. 6. 36. 42.]
120  cord_individual_obj[indivial_i,:] = [ 8. 5. 28. 33.]
121  cord_individual_obj[indivial_i,:] = [ 9. 4. 38. 42.]
122
123 min(cord_individual_obj[:,3]) = 14.0
124 historl_G_best_iter[iter,3] = 14.0
125 Begin iteration:
126
127 iter = 6
128  cord_individual_obj[indivial_i,:] = [ 0. 5. 38. 43.]
129  cord_individual_obj[indivial_i,:] = [ 1. 4. 50. 54.]
130  cord_individual_obj[indivial_i,:] = [ 2. 6. 8. 14.]
131  cord_individual_obj[indivial_i,:] = [ 3. 4. 34. 38.]
132  cord_individual_obj[indivial_i,:] = [ 4. 6. 64. 70.]
133  cord_individual_obj[indivial_i,:] = [ 5. 5. 68. 73.]
134  cord_individual_obj[indivial_i,:] = [ 6. 6. 50. 56.]
135  cord_individual_obj[indivial_i,:] = [ 7. 6. 52. 58.]
136  cord_individual_obj[indivial_i,:] = [ 8. 5. 28. 33.]
137  cord_individual_obj[indivial_i,:] = [ 9. 4. 28. 32.]
138
139 min(cord_individual_obj[:,3]) = 14.0
140 historl_G_best_iter[iter,3] = 14.0
141 Begin iteration:
142
143 iter = 7
144  cord_individual_obj[indivial_i,:] = [ 0. 4. 50. 54.]
145  cord_individual_obj[indivial_i,:] = [ 1. 4. 74. 78.]
146  cord_individual_obj[indivial_i,:] = [ 2. 6. 36. 42.]
147  cord_individual_obj[indivial_i,:] = [ 3. 6. 20. 26.]
148  cord_individual_obj[indivial_i,:] = [ 4. 6. 8. 14.]
149  cord_individual_obj[indivial_i,:] = [ 5. 6. 8. 14.]
150  cord_individual_obj[indivial_i,:] = [ 6. 6. 62. 68.]
151  cord_individual_obj[indivial_i,:] = [ 7. 6. 16. 22.]
152  cord_individual_obj[indivial_i,:] = [ 8. 4. 62. 66.]
153  cord_individual_obj[indivial_i,:] = [ 9. 6. 26. 32.]
154
155 min(cord_individual_obj[:,3]) = 14.0
156 historl_G_best_iter[iter,3] = 14.0
157 Begin iteration:
158
159 iter = 8
160  cord_individual_obj[indivial_i,:] = [ 0. 5. 34. 39.]
161  cord_individual_obj[indivial_i,:] = [ 1. 6. 8. 14.]
162  cord_individual_obj[indivial_i,:] = [ 2. 6. 38. 44.]
163  cord_individual_obj[indivial_i,:] = [ 3. 6. 34. 40.]

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164     cord_individual_obj[indivial_i, :] = [ 4. 6. 12. 18.]
165     cord_individual_obj[indivial_i, :] = [ 5. 6. 76. 82.]
166     cord_individual_obj[indivial_i, :] = [ 6. 5. 36. 41.]
167     cord_individual_obj[indivial_i, :] = [ 7. 6. 68. 74.]
168     cord_individual_obj[indivial_i, :] = [ 8. 6. 20. 26.]
169     cord_individual_obj[indivial_i, :] = [ 9. 4. 12. 16.]
170
171 min(cord_individual_obj[:, 3]) = 14.0
172 historl_G_best_iter[iter, 3] = 14.0
173 Begin iteration:
174
175 iter = 9
176     cord_individual_obj[indivial_i, :] = [ 0. 5. 42. 47.]
177     cord_individual_obj[indivial_i, :] = [ 1. 4. 8. 12.]
178     cord_individual_obj[indivial_i, :] = [ 2. 6. 20. 26.]
179     cord_individual_obj[indivial_i, :] = [ 3. 5. 32. 37.]
180     cord_individual_obj[indivial_i, :] = [ 4. 6. 42. 48.]
181     cord_individual_obj[indivial_i, :] = [ 5. 6. 8. 14.]
182     cord_individual_obj[indivial_i, :] = [ 6. 6. 58. 64.]
183     cord_individual_obj[indivial_i, :] = [ 7. 6. 52. 58.]
184     cord_individual_obj[indivial_i, :] = [ 8. 5. 12. 17.]
185     cord_individual_obj[indivial_i, :] = [ 9. 6. 20. 26.]
186
187 min(cord_individual_obj[:, 3]) = 12.0
188 historl_G_best_iter[iter, 3] = 12.0
189 Begin iteration:
190
191 iter = 10
192     cord_individual_obj[indivial_i, :] = [ 0. 4. 28. 32.]
193     cord_individual_obj[indivial_i, :] = [ 1. 5. 70. 75.]
194     cord_individual_obj[indivial_i, :] = [ 2. 4. 34. 38.]
195     cord_individual_obj[indivial_i, :] = [ 3. 4. 8. 12.]
196     cord_individual_obj[indivial_i, :] = [ 4. 4. 18. 22.]
197     cord_individual_obj[indivial_i, :] = [ 5. 6. 20. 26.]
198     cord_individual_obj[indivial_i, :] = [ 6. 4. 8. 12.]
199     cord_individual_obj[indivial_i, :] = [ 7. 5. 12. 17.]
200     cord_individual_obj[indivial_i, :] = [ 8. 6. 12. 18.]
201     cord_individual_obj[indivial_i, :] = [ 9. 4. 36. 40.]
202
203 min(cord_individual_obj[:, 3]) = 12.0
204 historl_G_best_iter[iter, 3] = 12.0
205 Begin iteration:
206
207 iter = 11
208     cord_individual_obj[indivial_i, :] = [ 0. 5. 42. 47.]
209     cord_individual_obj[indivial_i, :] = [ 1. 4. 8. 12.]
210     cord_individual_obj[indivial_i, :] = [ 2. 4. 38. 42.]
211     cord_individual_obj[indivial_i, :] = [ 3. 5. 12. 17.]
212     cord_individual_obj[indivial_i, :] = [ 4. 3. 12. 15.]
213     cord_individual_obj[indivial_i, :] = [ 5. 5. 44. 49.]
214     cord_individual_obj[indivial_i, :] = [ 6. 5. 28. 33.]
215     cord_individual_obj[indivial_i, :] = [ 7. 5. 74. 79.]
216     cord_individual_obj[indivial_i, :] = [ 8. 6. 12. 18.]
217     cord_individual_obj[indivial_i, :] = [ 9. 4. 34. 38.]
218
219 min(cord_individual_obj[:, 3]) = 12.0
220 historl_G_best_iter[iter, 3] = 12.0
221 Begin iteration:
222
223 iter = 12
224     cord_individual_obj[indivial_i, :] = [ 0. 5. 36. 41.]
225     cord_individual_obj[indivial_i, :] = [ 1. 5. 38. 43.]
226     cord_individual_obj[indivial_i, :] = [ 2. 4. 80. 84.]
227     cord_individual_obj[indivial_i, :] = [ 3. 4. 18. 22.]
228     cord_individual_obj[indivial_i, :] = [ 4. 3. 30. 33.]
229     cord_individual_obj[indivial_i, :] = [ 5. 5. 56. 61.]
230     cord_individual_obj[indivial_i, :] = [ 6. 5. 60. 65.]
231     cord_individual_obj[indivial_i, :] = [ 7. 4. 8. 12.]
232     cord_individual_obj[indivial_i, :] = [ 8. 5. 12. 17.]
233     cord_individual_obj[indivial_i, :] = [ 9. 4. 12. 16.]
234
235 min(cord_individual_obj[:, 3]) = 12.0
236 historl_G_best_iter[iter, 3] = 12.0
237 Begin iteration:
238
239 iter = 13
240     cord_individual_obj[indivial_i, :] = [ 0. 5. 28. 33.]
241     cord_individual_obj[indivial_i, :] = [ 1. 4. 102. 106.]
242     cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
243     cord_individual_obj[indivial_i, :] = [ 3. 6. 8. 14.]
244     cord_individual_obj[indivial_i, :] = [ 4. 3. 20. 23.]
245     cord_individual_obj[indivial_i, :] = [ 5. 5. 34. 39.]
246     cord_individual_obj[indivial_i, :] = [ 6. 5. 48. 53.]
247     cord_individual_obj[indivial_i, :] = [ 7. 5. 44. 49.]

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248     cord_individual_obj[indivial_i, :] = [ 8. 4. 12. 16.]
249     cord_individual_obj[indivial_i, :] = [ 9. 4. 12. 16.]
250
251     min(cord_individual_obj[:, 3]) = 12.0
252     historl_G_best_iter[iter, 3] = 12.0
253 Begin iteration:
254
255 iter = 14
256     cord_individual_obj[indivial_i, :] = [ 0. 6. 28. 34.]
257     cord_individual_obj[indivial_i, :] = [ 1. 4. 8. 12.]
258     cord_individual_obj[indivial_i, :] = [ 2. 4. 108. 112.]
259     cord_individual_obj[indivial_i, :] = [ 3. 5. 44. 49.]
260     cord_individual_obj[indivial_i, :] = [ 4. 4. 12. 16.]
261     cord_individual_obj[indivial_i, :] = [ 5. 5. 60. 65.]
262     cord_individual_obj[indivial_i, :] = [ 6. 4. 50. 54.]
263     cord_individual_obj[indivial_i, :] = [ 7. 5. 58. 63.]
264     cord_individual_obj[indivial_i, :] = [ 8. 6. 12. 18.]
265     cord_individual_obj[indivial_i, :] = [ 9. 6. 8. 14.]
266
267     min(cord_individual_obj[:, 3]) = 12.0
268     historl_G_best_iter[iter, 3] = 12.0
269 Begin iteration:
270
271 iter = 15
272     cord_individual_obj[indivial_i, :] = [ 0. 5. 42. 47.]
273     cord_individual_obj[indivial_i, :] = [ 1. 5. 38. 43.]
274     cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
275     cord_individual_obj[indivial_i, :] = [ 3. 6. 12. 18.]
276     cord_individual_obj[indivial_i, :] = [ 4. 3. 68. 71.]
277     cord_individual_obj[indivial_i, :] = [ 5. 5. 44. 49.]
278     cord_individual_obj[indivial_i, :] = [ 6. 5. 48. 53.]
279     cord_individual_obj[indivial_i, :] = [ 7. 3. 84. 87.]
280     cord_individual_obj[indivial_i, :] = [ 8. 6. 12. 18.]
281     cord_individual_obj[indivial_i, :] = [ 9. 4. 40. 44.]
282
283     min(cord_individual_obj[:, 3]) = 12.0
284     historl_G_best_iter[iter, 3] = 12.0
285 Begin iteration:
286
287 iter = 16
288     cord_individual_obj[indivial_i, :] = [ 0. 5. 12. 17.]
289     cord_individual_obj[indivial_i, :] = [ 1. 5. 56. 61.]
290     cord_individual_obj[indivial_i, :] = [ 2. 4. 108. 112.]
291     cord_individual_obj[indivial_i, :] = [ 3. 5. 20. 25.]
292     cord_individual_obj[indivial_i, :] = [ 4. 3. 60. 63.]
293     cord_individual_obj[indivial_i, :] = [ 5. 3. 104. 107.]
294     cord_individual_obj[indivial_i, :] = [ 6. 5. 56. 61.]
295     cord_individual_obj[indivial_i, :] = [ 7. 4. 8. 12.]
296     cord_individual_obj[indivial_i, :] = [ 8. 5. 20. 25.]
297     cord_individual_obj[indivial_i, :] = [ 9. 4. 12. 16.]
298
299     min(cord_individual_obj[:, 3]) = 12.0
300     historl_G_best_iter[iter, 3] = 12.0
301 Begin iteration:
302
303 iter = 17
304     cord_individual_obj[indivial_i, :] = [ 0. 5. 62. 67.]
305     cord_individual_obj[indivial_i, :] = [ 1. 5. 38. 43.]
306     cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
307     cord_individual_obj[indivial_i, :] = [ 3. 4. 12. 16.]
308     cord_individual_obj[indivial_i, :] = [ 4. 3. 38. 41.]
309     cord_individual_obj[indivial_i, :] = [ 5. 5. 30. 35.]
310     cord_individual_obj[indivial_i, :] = [ 6. 4. 74. 78.]
311     cord_individual_obj[indivial_i, :] = [ 7. 5. 76. 81.]
312     cord_individual_obj[indivial_i, :] = [ 8. 5. 12. 17.]
313     cord_individual_obj[indivial_i, :] = [ 9. 4. 30. 34.]
314
315     min(cord_individual_obj[:, 3]) = 12.0
316     historl_G_best_iter[iter, 3] = 12.0
317 Begin iteration:
318
319 iter = 18
320     cord_individual_obj[indivial_i, :] = [ 0. 6. 24. 30.]
321     cord_individual_obj[indivial_i, :] = [ 1. 5. 22. 27.]
322     cord_individual_obj[indivial_i, :] = [ 2. 4. 84. 88.]
323     cord_individual_obj[indivial_i, :] = [ 3. 6. 8. 14.]
324     cord_individual_obj[indivial_i, :] = [ 4. 3. 20. 23.]
325     cord_individual_obj[indivial_i, :] = [ 5. 5. 44. 49.]
326     cord_individual_obj[indivial_i, :] = [ 6. 5. 40. 45.]
327     cord_individual_obj[indivial_i, :] = [ 7. 4. 8. 12.]
328     cord_individual_obj[indivial_i, :] = [ 8. 6. 8. 14.]
329     cord_individual_obj[indivial_i, :] = [ 9. 6. 8. 14.]
330
331     min(cord_individual_obj[:, 3]) = 12.0

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unknown

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332 historl_G_best_iter[iter, 3] = 12.0
333 Begin iteration:
334
335 iter = 19
336 cord_individual_obj[indivial_i, :] = [ 0. 5. 16. 21.]
337 cord_individual_obj[indivial_i, :] = [ 1. 5. 56. 61.]
338 cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
339 cord_individual_obj[indivial_i, :] = [ 3. 6. 12. 18.]
340 cord_individual_obj[indivial_i, :] = [ 4. 3. 30. 33.]
341 cord_individual_obj[indivial_i, :] = [ 5. 5. 22. 27.]
342 cord_individual_obj[indivial_i, :] = [ 6. 5. 32. 37.]
343 cord_individual_obj[indivial_i, :] = [ 7. 5. 44. 49.]
344 cord_individual_obj[indivial_i, :] = [ 8. 6. 12. 18.]
345 cord_individual_obj[indivial_i, :] = [ 9. 6. 44. 50.]
346
347 min(cord_individual_obj[:, 3]) = 12.0
348 historl_G_best_iter[iter, 3] = 12.0
349 Begin iteration:
350
351 iter = 20
352 cord_individual_obj[indivial_i, :] = [ 0. 5. 20. 25.]
353 cord_individual_obj[indivial_i, :] = [ 1. 4. 8. 12.]
354 cord_individual_obj[indivial_i, :] = [ 2. 5. 58. 63.]
355 cord_individual_obj[indivial_i, :] = [ 3. 5. 36. 41.]
356 cord_individual_obj[indivial_i, :] = [ 4. 3. 50. 53.]
357 cord_individual_obj[indivial_i, :] = [ 5. 3. 78. 81.]
358 cord_individual_obj[indivial_i, :] = [ 6. 5. 46. 51.]
359 cord_individual_obj[indivial_i, :] = [ 7. 5. 138. 143.]
360 cord_individual_obj[indivial_i, :] = [ 8. 5. 20. 25.]
361 cord_individual_obj[indivial_i, :] = [ 9. 4. 20. 24.]
362
363 min(cord_individual_obj[:, 3]) = 12.0
364 historl_G_best_iter[iter, 3] = 12.0
365 Begin iteration:
366
367 iter = 21
368 cord_individual_obj[indivial_i, :] = [ 0. 5. 30. 35.]
369 cord_individual_obj[indivial_i, :] = [ 1. 5. 38. 43.]
370 cord_individual_obj[indivial_i, :] = [ 2. 4. 108. 112.]
371 cord_individual_obj[indivial_i, :] = [ 3. 5. 12. 17.]
372 cord_individual_obj[indivial_i, :] = [ 4. 3. 68. 71.]
373 cord_individual_obj[indivial_i, :] = [ 5. 5. 60. 65.]
374 cord_individual_obj[indivial_i, :] = [ 6. 5. 32. 37.]
375 cord_individual_obj[indivial_i, :] = [ 7. 4. 8. 12.]
376 cord_individual_obj[indivial_i, :] = [ 8. 4. 12. 16.]
377 cord_individual_obj[indivial_i, :] = [ 9. 4. 30. 34.]
378
379 min(cord_individual_obj[:, 3]) = 12.0
380 historl_G_best_iter[iter, 3] = 12.0
381 Begin iteration:
382
383 iter = 22
384 cord_individual_obj[indivial_i, :] = [ 0. 5. 38. 43.]
385 cord_individual_obj[indivial_i, :] = [ 1. 4. 88. 92.]
386 cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
387 cord_individual_obj[indivial_i, :] = [ 3. 5. 12. 17.]
388 cord_individual_obj[indivial_i, :] = [ 4. 3. 30. 33.]
389 cord_individual_obj[indivial_i, :] = [ 5. 5. 68. 73.]
390 cord_individual_obj[indivial_i, :] = [ 6. 5. 68. 73.]
391 cord_individual_obj[indivial_i, :] = [ 7. 5. 112. 117.]
392 cord_individual_obj[indivial_i, :] = [ 8. 5. 12. 17.]
393 cord_individual_obj[indivial_i, :] = [ 9. 4. 12. 16.]
394
395 min(cord_individual_obj[:, 3]) = 12.0
396 historl_G_best_iter[iter, 3] = 12.0
397 Begin iteration:
398
399 iter = 23
400 cord_individual_obj[indivial_i, :] = [ 0. 5. 20. 25.]
401 cord_individual_obj[indivial_i, :] = [ 1. 5. 56. 61.]
402 cord_individual_obj[indivial_i, :] = [ 2. 5. 94. 99.]
403 cord_individual_obj[indivial_i, :] = [ 3. 5. 36. 41.]
404 cord_individual_obj[indivial_i, :] = [ 4. 4. 30. 34.]
405 cord_individual_obj[indivial_i, :] = [ 5. 4. 30. 34.]
406 cord_individual_obj[indivial_i, :] = [ 6. 5. 82. 87.]
407 cord_individual_obj[indivial_i, :] = [ 7. 4. 8. 12.]
408 cord_individual_obj[indivial_i, :] = [ 8. 5. 20. 25.]
409 cord_individual_obj[indivial_i, :] = [ 9. 4. 20. 24.]
410
411 min(cord_individual_obj[:, 3]) = 12.0
412 historl_G_best_iter[iter, 3] = 12.0
413 Begin iteration:
414
415 iter = 24
```

```

416 cord_individual_obj[indivial_i,:] = [ 0. 5. 38. 43.]
417 cord_individual_obj[indivial_i,:] = [ 1. 4. 52. 56.]
418 cord_individual_obj[indivial_i,:] = [ 2. 4. 8. 12.]
419 cord_individual_obj[indivial_i,:] = [ 3. 4. 18. 22.]
420 cord_individual_obj[indivial_i,:] = [ 4. 3. 30. 33.]
421 cord_individual_obj[indivial_i,:] = [ 5. 5. 60. 65.]
422 cord_individual_obj[indivial_i,:] = [ 6. 4. 56. 60.]
423 cord_individual_obj[indivial_i,:] = [ 7. 5. 76. 81.]
424 cord_individual_obj[indivial_i,:] = [ 8. 4. 12. 16.]
425 cord_individual_obj[indivial_i,:] = [ 9. 4. 30. 34.]
426
427 min(cord_individual_obj[:,3]) = 12.0
428 historl_G_best_iter[iter,3] = 12.0
429 Begin iteration:
430
431 iter = 25
432 cord_individual_obj[indivial_i,:] = [ 0. 6. 16. 22.]
433 cord_individual_obj[indivial_i,:] = [ 1. 5. 120. 125.]
434 cord_individual_obj[indivial_i,:] = [ 2. 4. 84. 88.]
435 cord_individual_obj[indivial_i,:] = [ 3. 6. 12. 18.]
436 cord_individual_obj[indivial_i,:] = [ 4. 4. 24. 28.]
437 cord_individual_obj[indivial_i,:] = [ 5. 5. 56. 61.]
438 cord_individual_obj[indivial_i,:] = [ 6. 5. 48. 53.]
439 cord_individual_obj[indivial_i,:] = [ 7. 4. 8. 12.]
440 cord_individual_obj[indivial_i,:] = [ 8. 6. 12. 18.]
441 cord_individual_obj[indivial_i,:] = [ 9. 6. 8. 14.]
442
443 min(cord_individual_obj[:,3]) = 12.0
444 historl_G_best_iter[iter,3] = 12.0
445 Begin iteration:
446
447 iter = 26
448 cord_individual_obj[indivial_i,:] = [ 0. 5. 56. 61.]
449 cord_individual_obj[indivial_i,:] = [ 1. 4. 8. 12.]
450 cord_individual_obj[indivial_i,:] = [ 2. 5. 94. 99.]
451 cord_individual_obj[indivial_i,:] = [ 3. 5. 20. 25.]
452 cord_individual_obj[indivial_i,:] = [ 4. 3. 50. 53.]
453 cord_individual_obj[indivial_i,:] = [ 5. 4. 36. 40.]
454 cord_individual_obj[indivial_i,:] = [ 6. 5. 62. 67.]
455 cord_individual_obj[indivial_i,:] = [ 7. 5. 112. 117.]
456 cord_individual_obj[indivial_i,:] = [ 8. 5. 30. 35.]
457 cord_individual_obj[indivial_i,:] = [ 9. 4. 92. 96.]
458
459 min(cord_individual_obj[:,3]) = 12.0
460 historl_G_best_iter[iter,3] = 12.0
461 Begin iteration:
462
463 iter = 27
464 cord_individual_obj[indivial_i,:] = [ 0. 4. 48. 52.]
465 cord_individual_obj[indivial_i,:] = [ 1. 5. 58. 63.]
466 cord_individual_obj[indivial_i,:] = [ 2. 5. 72. 77.]
467 cord_individual_obj[indivial_i,:] = [ 3. 6. 8. 14.]
468 cord_individual_obj[indivial_i,:] = [ 4. 4. 28. 32.]
469 cord_individual_obj[indivial_i,:] = [ 5. 5. 8. 13.]
470 cord_individual_obj[indivial_i,:] = [ 6. 5. 24. 29.]
471 cord_individual_obj[indivial_i,:] = [ 7. 4. 8. 12.]
472 cord_individual_obj[indivial_i,:] = [ 8. 4. 12. 16.]
473 cord_individual_obj[indivial_i,:] = [ 9. 5. 30. 35.]
474
475 min(cord_individual_obj[:,3]) = 12.0
476 historl_G_best_iter[iter,3] = 12.0
477 Begin iteration:
478
479 iter = 28
480 cord_individual_obj[indivial_i,:] = [ 0. 6. 38. 44.]
481 cord_individual_obj[indivial_i,:] = [ 1. 4. 12. 16.]
482 cord_individual_obj[indivial_i,:] = [ 2. 4. 8. 12.]
483 cord_individual_obj[indivial_i,:] = [ 3. 5. 12. 17.]
484 cord_individual_obj[indivial_i,:] = [ 4. 3. 48. 51.]
485 cord_individual_obj[indivial_i,:] = [ 5. 5. 28. 33.]
486 cord_individual_obj[indivial_i,:] = [ 6. 5. 48. 53.]
487 cord_individual_obj[indivial_i,:] = [ 7. 5. 76. 81.]
488 cord_individual_obj[indivial_i,:] = [ 8. 6. 20. 26.]
489 cord_individual_obj[indivial_i,:] = [ 9. 6. 12. 18.]
490
491 min(cord_individual_obj[:,3]) = 12.0
492 historl_G_best_iter[iter,3] = 12.0
493 Begin iteration:
494
495 iter = 29
496 cord_individual_obj[indivial_i,:] = [ 0. 5. 32. 37.]
497 cord_individual_obj[indivial_i,:] = [ 1. 6. 68. 74.]
498 cord_individual_obj[indivial_i,:] = [ 2. 4. 108. 112.]
499 cord_individual_obj[indivial_i,:] = [ 3. 4. 38. 42.]

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500 cord_individual_obj[indivial_i,:] = [ 4. 4. 18. 22.]
501 cord_individual_obj[indivial_i,:] = [ 5. 5. 8. 13.]
502 cord_individual_obj[indivial_i,:] = [ 6. 5. 28. 33.]
503 cord_individual_obj[indivial_i,:] = [ 7. 4. 8. 12.]
504 cord_individual_obj[indivial_i,:] = [ 8. 4. 12. 16.]
505 cord_individual_obj[indivial_i,:] = [ 9. 4. 48. 52.]
506
507 min(cord_individual_obj[:, 3]) = 12.0
508 historl_G_best_iter[iter, 3] = 12.0
509 Begin iteration:
510
511 iter = 30
512 cord_individual_obj[indivial_i,:] = [ 0. 5. 38. 43.]
513 cord_individual_obj[indivial_i,:] = [ 1. 5. 58. 63.]
514 cord_individual_obj[indivial_i,:] = [ 2. 4. 8. 12.]
515 cord_individual_obj[indivial_i,:] = [ 3. 5. 12. 17.]
516 cord_individual_obj[indivial_i,:] = [ 4. 3. 30. 33.]
517 cord_individual_obj[indivial_i,:] = [ 5. 5. 94. 99.]
518 cord_individual_obj[indivial_i,:] = [ 6. 4. 28. 32.]
519 cord_individual_obj[indivial_i,:] = [ 7. 5. 44. 49.]
520 cord_individual_obj[indivial_i,:] = [ 8. 5. 12. 17.]
521 cord_individual_obj[indivial_i,:] = [ 9. 4. 52. 56.]
522
523 min(cord_individual_obj[:, 3]) = 12.0
524 historl_G_best_iter[iter, 3] = 12.0
525 Begin iteration:
526
527 iter = 31
528 cord_individual_obj[indivial_i,:] = [ 0. 6. 28. 34.]
529 cord_individual_obj[indivial_i,:] = [ 1. 4. 12. 16.]
530 cord_individual_obj[indivial_i,:] = [ 2. 4. 84. 88.]
531 cord_individual_obj[indivial_i,:] = [ 3. 5. 40. 45.]
532 cord_individual_obj[indivial_i,:] = [ 4. 4. 20. 24.]
533 cord_individual_obj[indivial_i,:] = [ 5. 4. 8. 12.]
534 cord_individual_obj[indivial_i,:] = [ 6. 4. 38. 42.]
535 cord_individual_obj[indivial_i,:] = [ 7. 5. 94. 99.]
536 cord_individual_obj[indivial_i,:] = [ 8. 6. 8. 14.]
537 cord_individual_obj[indivial_i,:] = [ 9. 6. 32. 38.]
538
539 min(cord_individual_obj[:, 3]) = 12.0
540 historl_G_best_iter[iter, 3] = 12.0
541 Begin iteration:
542
543 iter = 32
544 cord_individual_obj[indivial_i,:] = [ 0. 5. 44. 49.]
545 cord_individual_obj[indivial_i,:] = [ 1. 5. 82. 87.]
546 cord_individual_obj[indivial_i,:] = [ 2. 4. 118. 122.]
547 cord_individual_obj[indivial_i,:] = [ 3. 5. 12. 17.]
548 cord_individual_obj[indivial_i,:] = [ 4. 3. 60. 63.]
549 cord_individual_obj[indivial_i,:] = [ 5. 5. 94. 99.]
550 cord_individual_obj[indivial_i,:] = [ 6. 4. 90. 94.]
551 cord_individual_obj[indivial_i,:] = [ 7. 4. 8. 12.]
552 cord_individual_obj[indivial_i,:] = [ 8. 5. 20. 25.]
553 cord_individual_obj[indivial_i,:] = [ 9. 4. 20. 24.]
554
555 min(cord_individual_obj[:, 3]) = 12.0
556 historl_G_best_iter[iter, 3] = 12.0
557 Begin iteration:
558
559 iter = 33
560 cord_individual_obj[indivial_i,:] = [ 0. 5. 62. 67.]
561 cord_individual_obj[indivial_i,:] = [ 1. 5. 38. 43.]
562 cord_individual_obj[indivial_i,:] = [ 2. 4. 8. 12.]
563 cord_individual_obj[indivial_i,:] = [ 3. 5. 12. 17.]
564 cord_individual_obj[indivial_i,:] = [ 4. 3. 38. 41.]
565 cord_individual_obj[indivial_i,:] = [ 5. 5. 38. 43.]
566 cord_individual_obj[indivial_i,:] = [ 6. 5. 68. 73.]
567 cord_individual_obj[indivial_i,:] = [ 7. 5. 76. 81.]
568 cord_individual_obj[indivial_i,:] = [ 8. 5. 12. 17.]
569 cord_individual_obj[indivial_i,:] = [ 9. 4. 30. 34.]
570
571 min(cord_individual_obj[:, 3]) = 12.0
572 historl_G_best_iter[iter, 3] = 12.0
573 Begin iteration:
574
575 iter = 34
576 cord_individual_obj[indivial_i,:] = [ 0. 5. 20. 25.]
577 cord_individual_obj[indivial_i,:] = [ 1. 5. 62. 67.]
578 cord_individual_obj[indivial_i,:] = [ 2. 4. 84. 88.]
579 cord_individual_obj[indivial_i,:] = [ 3. 5. 36. 41.]
580 cord_individual_obj[indivial_i,:] = [ 4. 4. 30. 34.]
581 cord_individual_obj[indivial_i,:] = [ 5. 4. 30. 34.]
582 cord_individual_obj[indivial_i,:] = [ 6. 5. 38. 43.]
583 cord_individual_obj[indivial_i,:] = [ 7. 4. 8. 12.]

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```

584     cord_individual_obj[indivial_i, :] = [ 8. 5. 20. 25.]
585     cord_individual_obj[indivial_i, :] = [ 9. 4. 72. 76.]
586
587     min(cord_individual_obj[:, 3]) = 12.0
588     historl_G_best_iter[iter, 3] = 12.0
589 Begin iteration:
590
591 iter = 35
592     cord_individual_obj[indivial_i, :] = [ 0. 5. 28. 33.]
593     cord_individual_obj[indivial_i, :] = [ 1. 4. 84. 88.]
594     cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
595     cord_individual_obj[indivial_i, :] = [ 3. 6. 12. 18.]
596     cord_individual_obj[indivial_i, :] = [ 4. 3. 20. 23.]
597     cord_individual_obj[indivial_i, :] = [ 5. 5. 20. 25.]
598     cord_individual_obj[indivial_i, :] = [ 6. 5. 32. 37.]
599     cord_individual_obj[indivial_i, :] = [ 7. 5. 76. 81.]
600     cord_individual_obj[indivial_i, :] = [ 8. 4. 12. 16.]
601     cord_individual_obj[indivial_i, :] = [ 9. 6. 42. 48.]
602
603     min(cord_individual_obj[:, 3]) = 12.0
604     historl_G_best_iter[iter, 3] = 12.0
605 Begin iteration:
606
607 iter = 36
608     cord_individual_obj[indivial_i, :] = [ 0. 5. 72. 77.]
609     cord_individual_obj[indivial_i, :] = [ 1. 4. 8. 12.]
610     cord_individual_obj[indivial_i, :] = [ 2. 5. 58. 63.]
611     cord_individual_obj[indivial_i, :] = [ 3. 5. 20. 25.]
612     cord_individual_obj[indivial_i, :] = [ 4. 3. 30. 33.]
613     cord_individual_obj[indivial_i, :] = [ 5. 4. 56. 60.]
614     cord_individual_obj[indivial_i, :] = [ 6. 5. 56. 61.]
615     cord_individual_obj[indivial_i, :] = [ 7. 4. 62. 66.]
616     cord_individual_obj[indivial_i, :] = [ 8. 5. 20. 25.]
617     cord_individual_obj[indivial_i, :] = [ 9. 4. 20. 24.]
618
619     min(cord_individual_obj[:, 3]) = 12.0
620     historl_G_best_iter[iter, 3] = 12.0
621 Begin iteration:
622
623 iter = 37
624     cord_individual_obj[indivial_i, :] = [ 0. 4. 8. 12.]
625     cord_individual_obj[indivial_i, :] = [ 1. 5. 38. 43.]
626     cord_individual_obj[indivial_i, :] = [ 2. 5. 94. 99.]
627     cord_individual_obj[indivial_i, :] = [ 3. 6. 54. 60.]
628     cord_individual_obj[indivial_i, :] = [ 4. 4. 20. 24.]
629     cord_individual_obj[indivial_i, :] = [ 5. 5. 20. 25.]
630     cord_individual_obj[indivial_i, :] = [ 6. 5. 48. 53.]
631     cord_individual_obj[indivial_i, :] = [ 7. 5. 18. 23.]
632     cord_individual_obj[indivial_i, :] = [ 8. 5. 8. 13.]
633     cord_individual_obj[indivial_i, :] = [ 9. 6. 58. 64.]
634
635     min(cord_individual_obj[:, 3]) = 12.0
636     historl_G_best_iter[iter, 3] = 12.0
637 Begin iteration:
638
639 iter = 38
640     cord_individual_obj[indivial_i, :] = [ 0. 5. 62. 67.]
641     cord_individual_obj[indivial_i, :] = [ 1. 4. 38. 42.]
642     cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
643     cord_individual_obj[indivial_i, :] = [ 3. 5. 12. 17.]
644     cord_individual_obj[indivial_i, :] = [ 4. 3. 30. 33.]
645     cord_individual_obj[indivial_i, :] = [ 5. 5. 94. 99.]
646     cord_individual_obj[indivial_i, :] = [ 6. 5. 46. 51.]
647     cord_individual_obj[indivial_i, :] = [ 7. 5. 76. 81.]
648     cord_individual_obj[indivial_i, :] = [ 8. 4. 12. 16.]
649     cord_individual_obj[indivial_i, :] = [ 9. 4. 12. 16.]
650
651     min(cord_individual_obj[:, 3]) = 12.0
652     historl_G_best_iter[iter, 3] = 12.0
653 Begin iteration:
654
655 iter = 39
656     cord_individual_obj[indivial_i, :] = [ 0. 6. 28. 34.]
657     cord_individual_obj[indivial_i, :] = [ 1. 6. 8. 14.]
658     cord_individual_obj[indivial_i, :] = [ 2. 4. 108. 112.]
659     cord_individual_obj[indivial_i, :] = [ 3. 4. 14. 18.]
660     cord_individual_obj[indivial_i, :] = [ 4. 5. 50. 55.]
661     cord_individual_obj[indivial_i, :] = [ 5. 4. 8. 12.]
662     cord_individual_obj[indivial_i, :] = [ 6. 5. 28. 33.]
663     cord_individual_obj[indivial_i, :] = [ 7. 5. 62. 67.]
664     cord_individual_obj[indivial_i, :] = [ 8. 5. 8. 13.]
665     cord_individual_obj[indivial_i, :] = [ 9. 5. 48. 53.]
666
667     min(cord_individual_obj[:, 3]) = 12.0

```

```

668 historl_G_best_iter[iter, 3] = 12.0
669 Begin iteration:
670
671 iter = 40
672 cord_individual_obj[indivial_i, :] = [ 0. 5. 36. 41.]
673 cord_individual_obj[indivial_i, :] = [ 1. 5. 12. 17.]
674 cord_individual_obj[indivial_i, :] = [ 2. 4. 8. 12.]
675 cord_individual_obj[indivial_i, :] = [ 3. 5. 12. 17.]
676 cord_individual_obj[indivial_i, :] = [ 4. 3. 38. 41.]
677 cord_individual_obj[indivial_i, :] = [ 5. 5. 94. 99.]
678 cord_individual_obj[indivial_i, :] = [ 6. 5. 102. 107.]
679 cord_individual_obj[indivial_i, :] = [ 7. 3. 54. 57.]
680 cord_individual_obj[indivial_i, :] = [ 8. 5. 20. 25.]
681 cord_individual_obj[indivial_i, :] = [ 9. 4. 44. 48.]
682
683 min(cord_individual_obj[:, 3]) = 12.0
684 historl_G_best_iter[iter, 3] = 12.0
685 Iteration calculate over
686
687
688
689
690 All item are in Bin and:
691 Bin area = 1080
692 Real_area = 89.0
693 Proportion_of_area = 0.0824074074074074
694 BEST_CHROM =
695     berth: [ 2.5 26. 8. 20.5 12.5 16. ]
696     time: [0. 0. 0. 0. 0. ]
697     num_QC: [3. 2. 5. 2. 2. 3.]
698 Objective function values and some other indicators:
699 Obj0 = 4.00       Obj1 = 8.00       Obj0 + Obj1 = 12.00
700 Total movement of crane: 8.00
701 Total waiting time in berth position: 0.00
702 Total index of q during berthing: 573.00
703 Specific arrangement for each vessel:
704     V_id: 0           li: 5.0           xi: 2.5           bow of i: 0.0           tail of i: 5.0           gama_i0: 0.0           gama_i1: 1.0
705                    gama_i1 + 1: 2.0      gama_i1 - gama_i0: 1.0      duration_time_i: 2.0      demand_i: 80.0           work load_i:
706     80.0            work load gap_i: 0
707     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
708                    gama_i1 + 1: 3.0      gama_i1 - gama_i0: 2.0      duration_time_i: 3.0      demand_i: 120.0           work
709     load_i: 120.0    work load gap_i: 0
710     V_id: 2           li: 6.0           xi: 8.0           bow of i: 5.0           tail of i: 11.0           gama_i0: 0.0           gama_i1: 2.0
711                    gama_i1 + 1: 3.0      gama_i1 - gama_i0: 2.0      duration_time_i: 3.0      demand_i: 260.0           work load_i:
712     260.0           work load gap_i: 0
713     V_id: 3           li: 5.0           xi: 20.5           bow of i: 18.0           tail of i: 23.0           gama_i0: 0.0           gama_i1: 1
714                    gama_i1 + 1: 2.0      gama_i1 - gama_i0: 1.0      duration_time_i: 2.0      demand_i: 80.0           work
715     load_i: 80.0    work load gap_i: 0
716     V_id: 4           li: 3.0           xi: 12.5           bow of i: 11.0           tail of i: 14.0           gama_i0: 0.0           gama_i1: 4
717                    gama_i1 + 1: 5.0      gama_i1 - gama_i0: 4.0      duration_time_i: 5.0      demand_i: 200.0           work
718     load_i: 200.0    work load gap_i: 0
719     V_id: 5           li: 4.0           xi: 16.0           bow of i: 14.0           tail of i: 18.0           gama_i0: 0.0           gama_i1: 3
720                    gama_i1 + 1: 4.0      gama_i1 - gama_i0: 3.0      duration_time_i: 4.0      demand_i: 220.0           work
721     load_i: 220.0    work load gap_i: 0
722
723 Algorithm finished and the total CPU time: 136 s
724 End
725

```