```
 1  "E:\1 □□□□\3 □□□□□\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=22254
 2
 3  import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4  sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□□\\1 □□□□□□□□\\1_□□□□□□_□□□□\\1_LW_□□□□2\\6 □□□□\\2 python code\\
    01_My_Python_Code', 'E:/1 □□□□/3 □□□□□/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_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 =  10
23        W_inertia =  0.5
24        oder_type_num =  15
25        c1 =  2.5
26        c2 =  1.0
27        r1 =  0.7876899673780055
28        r2 =  0.7876899673780055
29  Begin iteration:
30
31  iter =  0
32        cord_individul_obj[indivial_i, :] =  [ 0.  4. 50. 54.]
33        cord_individul_obj[indivial_i, :] =  [ 1.  5. 48. 53.]
34        cord_individul_obj[indivial_i, :] =  [ 2.  6. 18. 24.]
35        cord_individul_obj[indivial_i, :] =  [ 3.  4. 34. 38.]
36        cord_individul_obj[indivial_i, :] =  [ 4.  6. 12. 18.]
37        cord_individul_obj[indivial_i, :] =  [ 5.  4. 50. 54.]
38        cord_individul_obj[indivial_i, :] =  [ 6.  4. 54. 58.]
39        cord_individul_obj[indivial_i, :] =  [ 7.  5. 32. 37.]
40        cord_individul_obj[indivial_i, :] =  [ 8.  4. 102. 106.]
41        cord_individul_obj[indivial_i, :] =  [ 9.  6. 34. 40.]
42        cord_individul_obj[indivial_i, :] =  [10.  4. 36. 40.]
43        cord_individul_obj[indivial_i, :] =  [11.  6. 46. 52.]
44        cord_individul_obj[indivial_i, :] =  [12.  6. 34. 40.]
45        cord_individul_obj[indivial_i, :] =  [13.  6. 44. 50.]
46        cord_individul_obj[indivial_i, :] =  [14.  4. 46. 50.]
47
48     min(cord_individul_obj[:, 3]) =  18.0
49     historl_G_best_iter[iter, 3] =  18.0
50  Begin iteration:
51
52  iter =  1
53        cord_individul_obj[indivial_i, :] =  [ 0.  6. 22. 28.]
54        cord_individul_obj[indivial_i, :] =  [ 1.  6. 22. 28.]
55        cord_individul_obj[indivial_i, :] =  [ 2.  6. 18. 24.]
56        cord_individul_obj[indivial_i, :] =  [ 3.  6.  8. 14.]
57        cord_individul_obj[indivial_i, :] =  [ 4.  4. 32. 36.]
58        cord_individul_obj[indivial_i, :] =  [ 5.  6.  8. 14.]
59        cord_individul_obj[indivial_i, :] =  [ 6.  6. 18. 24.]
60        cord_individul_obj[indivial_i, :] =  [ 7.  6. 18. 24.]
61        cord_individul_obj[indivial_i, :] =  [ 8.  6. 12. 18.]
62        cord_individul_obj[indivial_i, :] =  [ 9.  4. 18. 22.]
63        cord_individul_obj[indivial_i, :] =  [10.  6. 18. 24.]
64        cord_individul_obj[indivial_i, :] =  [11.  6.  8. 14.]
65        cord_individul_obj[indivial_i, :] =  [12.  6.  8. 14.]
66        cord_individul_obj[indivial_i, :] =  [13.  5. 18. 23.]
67        cord_individul_obj[indivial_i, :] =  [14.  6. 30. 36.]
68
69     min(cord_individul_obj[:, 3]) =  14.0
70     historl_G_best_iter[iter, 3] =  14.0
71  Begin iteration:
72
73  iter =  2
74        cord_individul_obj[indivial_i, :] =  [ 0.  6. 28. 34.]
75        cord_individul_obj[indivial_i, :] =  [ 1.  6. 12. 18.]
76        cord_individul_obj[indivial_i, :] =  [ 2.  6. 12. 18.]
77        cord_individul_obj[indivial_i, :] =  [ 3.  6. 12. 18.]
78        cord_individul_obj[indivial_i, :] =  [ 4.  6.  8. 14.]
79        cord_individul_obj[indivial_i, :] =  [ 5.  5. 12. 17.]
```

```
 80        cord_individul_obj[indivial_i, :] = [ 6.  6. 12. 18.]
 81        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
 82        cord_individul_obj[indivial_i, :] = [ 8.  6. 12. 18.]
 83        cord_individul_obj[indivial_i, :] = [ 9.  6. 28. 34.]
 84        cord_individul_obj[indivial_i, :] = [10.  6. 12. 18.]
 85        cord_individul_obj[indivial_i, :] = [11.  6. 12. 18.]
 86        cord_individul_obj[indivial_i, :] = [12.  6. 12. 18.]
 87        cord_individul_obj[indivial_i, :] = [13.  6. 18. 24.]
 88        cord_individul_obj[indivial_i, :] = [14.  5. 18. 23.]
 89
 90     min(cord_individul_obj[:, 3]) =  14.0
 91     historl_G_best_iter[iter, 3] =  14.0
 92  Begin iteration:
 93
 94  iter =  3
 95        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
 96        cord_individul_obj[indivial_i, :] = [ 1.  6. 12. 18.]
 97        cord_individul_obj[indivial_i, :] = [ 2.  6. 12. 18.]
 98        cord_individul_obj[indivial_i, :] = [ 3.  6. 12. 18.]
 99        cord_individul_obj[indivial_i, :] = [ 4.  6. 12. 18.]
100        cord_individul_obj[indivial_i, :] = [ 5.  6. 16. 22.]
101        cord_individul_obj[indivial_i, :] = [ 6.  6. 12. 18.]
102        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
103        cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
104        cord_individul_obj[indivial_i, :] = [ 9.  6. 18. 24.]
105        cord_individul_obj[indivial_i, :] = [10.  6.  8. 14.]
106        cord_individul_obj[indivial_i, :] = [11.  5. 24. 29.]
107        cord_individul_obj[indivial_i, :] = [12.  6. 16. 22.]
108        cord_individul_obj[indivial_i, :] = [13.  4. 44. 48.]
109        cord_individul_obj[indivial_i, :] = [14.  6. 24. 30.]
110
111     min(cord_individul_obj[:, 3]) =  14.0
112     historl_G_best_iter[iter, 3] =  14.0
113  Begin iteration:
114
115  iter =  4
116        cord_individul_obj[indivial_i, :] = [ 0.  6. 56. 62.]
117        cord_individul_obj[indivial_i, :] = [ 1.  6. 12. 18.]
118        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
119        cord_individul_obj[indivial_i, :] = [ 3.  6. 18. 24.]
120        cord_individul_obj[indivial_i, :] = [ 4.  5. 18. 23.]
121        cord_individul_obj[indivial_i, :] = [ 5.  5. 54. 59.]
122        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
123        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
124        cord_individul_obj[indivial_i, :] = [ 8.  6. 12. 18.]
125        cord_individul_obj[indivial_i, :] = [ 9.  6.  8. 14.]
126        cord_individul_obj[indivial_i, :] = [10.  6. 28. 34.]
127        cord_individul_obj[indivial_i, :] = [11.  6.  8. 14.]
128        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
129        cord_individul_obj[indivial_i, :] = [13.  6.  8. 14.]
130        cord_individul_obj[indivial_i, :] = [14.  6. 12. 18.]
131
132     min(cord_individul_obj[:, 3]) =  14.0
133     historl_G_best_iter[iter, 3] =  14.0
134  Begin iteration:
135
136  iter =  5
137        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
138        cord_individul_obj[indivial_i, :] = [ 1.  6. 38. 44.]
139        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
140        cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
141        cord_individul_obj[indivial_i, :] = [ 4.  6. 28. 34.]
142        cord_individul_obj[indivial_i, :] = [ 5.  5. 12. 17.]
143        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
144        cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
145        cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
146        cord_individul_obj[indivial_i, :] = [ 9.  5. 18. 23.]
147        cord_individul_obj[indivial_i, :] = [10.  6. 14. 20.]
148        cord_individul_obj[indivial_i, :] = [11.  6.  8. 14.]
149        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
150        cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
151        cord_individul_obj[indivial_i, :] = [14.  5. 44. 49.]
152
153     min(cord_individul_obj[:, 3]) =  14.0
154     historl_G_best_iter[iter, 3] =  14.0
155  Begin iteration:
156
157  iter =  6
158        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
159        cord_individul_obj[indivial_i, :] = [ 1.  6. 16. 22.]
160        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
161        cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
162        cord_individul_obj[indivial_i, :] = [ 4.  5. 20. 25.]
163        cord_individul_obj[indivial_i, :] = [ 5.  6.  8. 14.]
```

```
164        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
165        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
166        cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
167        cord_individul_obj[indivial_i, :] = [ 9.  6. 18. 24.]
168        cord_individul_obj[indivial_i, :] = [10.  6.  8. 14.]
169        cord_individul_obj[indivial_i, :] = [11.  5. 32. 37.]
170        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
171        cord_individul_obj[indivial_i, :] = [13.  6.  8. 14.]
172        cord_individul_obj[indivial_i, :] = [14.  6.  8. 14.]
173
174     min(cord_individul_obj[:, 3]) =  14.0
175     historl_G_best_iter[iter, 3] =  14.0
176  Begin iteration:
177
178  iter =  7
179        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
180        cord_individul_obj[indivial_i, :] = [ 1.  6. 16. 22.]
181        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
182        cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
183        cord_individul_obj[indivial_i, :] = [ 4.  5. 18. 23.]
184        cord_individul_obj[indivial_i, :] = [ 5.  6.  8. 14.]
185        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
186        cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
187        cord_individul_obj[indivial_i, :] = [ 8.  6. 12. 18.]
188        cord_individul_obj[indivial_i, :] = [ 9.  6.  8. 14.]
189        cord_individul_obj[indivial_i, :] = [10.  6.  8. 14.]
190        cord_individul_obj[indivial_i, :] = [11.  6.  8. 14.]
191        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
192        cord_individul_obj[indivial_i, :] = [13.  5. 52. 57.]
193        cord_individul_obj[indivial_i, :] = [14.  5. 18. 23.]
194
195     min(cord_individul_obj[:, 3]) =  14.0
196     historl_G_best_iter[iter, 3] =  14.0
197  Begin iteration:
198
199  iter =  8
200        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
201        cord_individul_obj[indivial_i, :] = [ 1.  6. 16. 22.]
202        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
203        cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
204        cord_individul_obj[indivial_i, :] = [ 4.  6.  8. 14.]
205        cord_individul_obj[indivial_i, :] = [ 5.  5. 18. 23.]
206        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
207        cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
208        cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
209        cord_individul_obj[indivial_i, :] = [ 9.  5. 38. 43.]
210        cord_individul_obj[indivial_i, :] = [10.  6. 16. 22.]
211        cord_individul_obj[indivial_i, :] = [11.  6.  8. 14.]
212        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
213        cord_individul_obj[indivial_i, :] = [13.  6.  8. 14.]
214        cord_individul_obj[indivial_i, :] = [14.  6.  8. 14.]
215
216     min(cord_individul_obj[:, 3]) =  14.0
217     historl_G_best_iter[iter, 3] =  14.0
218  Begin iteration:
219
220  iter =  9
221        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
222        cord_individul_obj[indivial_i, :] = [ 1.  6. 16. 22.]
223        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
224        cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
225        cord_individul_obj[indivial_i, :] = [ 4.  5. 12. 17.]
226        cord_individul_obj[indivial_i, :] = [ 5.  6.  8. 14.]
227        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
228        cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
229        cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
230        cord_individul_obj[indivial_i, :] = [ 9.  6.  8. 14.]
231        cord_individul_obj[indivial_i, :] = [10.  6. 38. 44.]
232        cord_individul_obj[indivial_i, :] = [11.  5. 36. 41.]
233        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
234        cord_individul_obj[indivial_i, :] = [13.  6.  8. 14.]
235        cord_individul_obj[indivial_i, :] = [14.  5. 18. 23.]
236
237     min(cord_individul_obj[:, 3]) =  14.0
238     historl_G_best_iter[iter, 3] =  14.0
239  Begin iteration:
240
241  iter =  10
242        cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
243        cord_individul_obj[indivial_i, :] = [ 1.  6. 34. 40.]
244        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
245        cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
246        cord_individul_obj[indivial_i, :] = [ 4.  6.  8. 14.]
247        cord_individul_obj[indivial_i, :] = [ 5.  5. 18. 23.]
```

```
248        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
249        cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
250        cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
251        cord_individul_obj[indivial_i, :] = [ 9.  5. 38. 43.]
252        cord_individul_obj[indivial_i, :] = [10.  6.  8. 14.]
253        cord_individul_obj[indivial_i, :] = [11.  5. 18. 23.]
254        cord_individul_obj[indivial_i, :] = [12.  6.  8. 14.]
255        cord_individul_obj[indivial_i, :] = [13.  4. 32. 36.]
256        cord_individul_obj[indivial_i, :] = [14.  6. 12. 18.]
257
258      min(cord_individul_obj[:, 3]) =  14.0
259      historl_G_best_iter[iter, 3] =  14.0
260   Iteration calculate over
261
262
263
264
265   All item are in Bin and:
266      Bin area =  1080
267      Real_area =  119.0
268      Proportion_of_area =  0.11018518518518519
269        BEST_CHROM =
270          berth:  [14.5 20.  26.   2.5  6.5 10. ]
271          time:  [0. 0. 0. 0. 0. 0.]
272          num_QC:  [2. 2. 2. 2. 2. 2.]
273      Objective function values and some other indicators:
274      Obj0 = 6.00            Obj1 = 8.00           Obj0 + Obj1 = 14.00
275      Total movement of crane: 8.00
276      Total waiting time in berth position: 0.00
277      Total index of q during berthing: 585.00
278      Specific arrangement for each vessel:
```

279   V_id: 0   li: 5.0   xi: 14.5   bow of i: 12.0   tail of i: 17.0   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   work load gap_i: 0

280   V_id: 1   li: 6.0   xi: 20.0   bow of i: 17.0   tail of i: 23.0   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

281   V_id: 2   li: 6.0   xi: 26.0   bow of i: 23.0   tail of i: 29.0   gama_i0: 0.0   gama_i1: 6.0   gama_i1 + 1: 7.0   gama_i1 - gama_i0: 6.0   duration_time_i: 7.0   demand_i: 260.0   work load_i: 260.0   work load gap_i: 0

282   V_id: 3   li: 5.0   xi: 2.5   bow of i: 0.0   tail of i: 5.0   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   work load gap_i: 0

283   V_id: 4   li: 3.0   xi: 6.5   bow of i: 5.0   tail of i: 8.0   gama_i0: 0.0   gama_i1: 4.0   gama_i1 + 1: 5.0   gama_i1 - gama_i0: 4.0   duration_time_i: 5.0   demand_i: 200.0   work load_i: 200.0   work load gap_i: 0

284   V_id: 5   li: 4.0   xi: 10.0   bow of i: 8.0   tail of i: 12.0   gama_i0: 0.0   gama_i1: 5.0   gama_i1 + 1: 6.0   gama_i1 - gama_i0: 5.0   duration_time_i: 6.0   demand_i: 220.0   work load_i: 220.0   work load gap_i: 0

```
285
286   Algorithm finished and the total CPU time: 236 s
287   End
288
```