```
 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=21666
 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 =  0.25705974219752326
28          r2 =  0.25705974219752326
29  Begin iteration:
30
31  iter =  0
32          cord_individul_obj[indivial_i, :] =  [ 0.  5. 34. 39.]
33          cord_individul_obj[indivial_i, :] =  [ 1.  4. 94. 98.]
34          cord_individul_obj[indivial_i, :] =  [ 2.   5.  98. 103.]
35          cord_individul_obj[indivial_i, :] =  [ 3.   4. 108. 112.]
36          cord_individul_obj[indivial_i, :] =  [ 4.  6. 78. 84.]
37          cord_individul_obj[indivial_i, :] =  [ 5.  6. 38. 44.]
38          cord_individul_obj[indivial_i, :] =  [ 6.  4. 32. 36.]
39          cord_individul_obj[indivial_i, :] =  [ 7.  5. 20. 25.]
40          cord_individul_obj[indivial_i, :] =  [ 8.  5. 64. 69.]
41          cord_individul_obj[indivial_i, :] =  [ 9.  5. 58. 63.]
42          cord_individul_obj[indivial_i, :] =  [10.  4. 66. 70.]
43          cord_individul_obj[indivial_i, :] =  [11.  5. 44. 49.]
44          cord_individul_obj[indivial_i, :] =  [12.  5. 48. 53.]
45          cord_individul_obj[indivial_i, :] =  [13.  5. 36. 41.]
46          cord_individul_obj[indivial_i, :] =  [14.  4. 62. 66.]
47
48      min(cord_individul_obj[:, 3]) =  25.0
49      historl_G_best_iter[iter, 3] =  25.0
50  Begin iteration:
51
52  iter =  1
53          cord_individul_obj[indivial_i, :] =  [ 0.  6. 60. 66.]
54          cord_individul_obj[indivial_i, :] =  [ 1.  5. 20. 25.]
55          cord_individul_obj[indivial_i, :] =  [ 2.  5. 16. 21.]
56          cord_individul_obj[indivial_i, :] =  [ 3.  5. 20. 25.]
57          cord_individul_obj[indivial_i, :] =  [ 4.  5. 16. 21.]
58          cord_individul_obj[indivial_i, :] =  [ 5.  5. 16. 21.]
59          cord_individul_obj[indivial_i, :] =  [ 6.  6. 28. 34.]
60          cord_individul_obj[indivial_i, :] =  [ 7.  6. 42. 48.]
61          cord_individul_obj[indivial_i, :] =  [ 8.  6. 42. 48.]
62          cord_individul_obj[indivial_i, :] =  [ 9.  4. 26. 30.]
63          cord_individul_obj[indivial_i, :] =  [10.  6. 42. 48.]
64          cord_individul_obj[indivial_i, :] =  [11.  5. 60. 65.]
65          cord_individul_obj[indivial_i, :] =  [12.  4. 50. 54.]
66          cord_individul_obj[indivial_i, :] =  [13.  5. 20. 25.]
67          cord_individul_obj[indivial_i, :] =  [14.  5. 36. 41.]
68
69      min(cord_individul_obj[:, 3]) =  21.0
70      historl_G_best_iter[iter, 3] =  21.0
71  Begin iteration:
72
73  iter =  2
74          cord_individul_obj[indivial_i, :] =  [ 0.  5. 16. 21.]
75          cord_individul_obj[indivial_i, :] =  [ 1.  5. 28. 33.]
76          cord_individul_obj[indivial_i, :] =  [ 2.  6. 56. 62.]
77          cord_individul_obj[indivial_i, :] =  [ 3.  6. 28. 34.]
78          cord_individul_obj[indivial_i, :] =  [ 4.  4. 34. 38.]
79          cord_individul_obj[indivial_i, :] =  [ 5.  4. 34. 38.]
```

```
80       cord_individul_obj[indivial_i, :] = [ 6.  6. 48. 54.]
81       cord_individul_obj[indivial_i, :] = [ 7.  6. 32. 38.]
82       cord_individul_obj[indivial_i, :] = [ 8.  6. 42. 48.]
83       cord_individul_obj[indivial_i, :] = [ 9.  5. 28. 33.]
84       cord_individul_obj[indivial_i, :] = [10.  6. 28. 34.]
85       cord_individul_obj[indivial_i, :] = [11.  5. 42. 47.]
86       cord_individul_obj[indivial_i, :] = [12.  4. 48. 52.]
87       cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
88       cord_individul_obj[indivial_i, :] = [14.  6. 60. 66.]
89
90     min(cord_individul_obj[:, 3]) =  21.0
91     historl_G_best_iter[iter, 3] =  21.0
92   Begin iteration:
93
94   iter =  3
95       cord_individul_obj[indivial_i, :] = [ 0.  6. 38. 44.]
96       cord_individul_obj[indivial_i, :] = [ 1.  5. 28. 33.]
97       cord_individul_obj[indivial_i, :] = [ 2.  6. 56. 62.]
98       cord_individul_obj[indivial_i, :] = [ 3.  6. 68. 74.]
99       cord_individul_obj[indivial_i, :] = [ 4.  5. 28. 33.]
100      cord_individul_obj[indivial_i, :] = [ 5.  5. 28. 33.]
101      cord_individul_obj[indivial_i, :] = [ 6.  6. 28. 34.]
102      cord_individul_obj[indivial_i, :] = [ 7.  6. 38. 44.]
103      cord_individul_obj[indivial_i, :] = [ 8.  6. 60. 66.]
104      cord_individul_obj[indivial_i, :] = [ 9.  5. 28. 33.]
105      cord_individul_obj[indivial_i, :] = [10.  6. 42. 48.]
106      cord_individul_obj[indivial_i, :] = [11.  5. 32. 37.]
107      cord_individul_obj[indivial_i, :] = [12.  4. 34. 38.]
108      cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
109      cord_individul_obj[indivial_i, :] = [14.  5. 16. 21.]
110
111      min(cord_individul_obj[:, 3]) =  21.0
112      historl_G_best_iter[iter, 3] =  21.0
113   Begin iteration:
114
115   iter =  4
116      cord_individul_obj[indivial_i, :] = [ 0.  6. 48. 54.]
117      cord_individul_obj[indivial_i, :] = [ 1.  5. 28. 33.]
118      cord_individul_obj[indivial_i, :] = [ 2.  6. 48. 54.]
119      cord_individul_obj[indivial_i, :] = [ 3.  5. 16. 21.]
120      cord_individul_obj[indivial_i, :] = [ 4.  5. 28. 33.]
121      cord_individul_obj[indivial_i, :] = [ 5.  4. 34. 38.]
122      cord_individul_obj[indivial_i, :] = [ 6.  6. 60. 66.]
123      cord_individul_obj[indivial_i, :] = [ 7.  6. 38. 44.]
124      cord_individul_obj[indivial_i, :] = [ 8.  6. 28. 34.]
125      cord_individul_obj[indivial_i, :] = [ 9.  5. 28. 33.]
126      cord_individul_obj[indivial_i, :] = [10.  6. 42. 48.]
127      cord_individul_obj[indivial_i, :] = [11.  5. 32. 37.]
128      cord_individul_obj[indivial_i, :] = [12.  5. 28. 33.]
129      cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
130      cord_individul_obj[indivial_i, :] = [14.  6. 28. 34.]
131
132      min(cord_individul_obj[:, 3]) =  21.0
133      historl_G_best_iter[iter, 3] =  21.0
134   Begin iteration:
135
136   iter =  5
137      cord_individul_obj[indivial_i, :] = [ 0.  5. 38. 43.]
138      cord_individul_obj[indivial_i, :] = [ 1.  5. 16. 21.]
139      cord_individul_obj[indivial_i, :] = [ 2.  6. 48. 54.]
140      cord_individul_obj[indivial_i, :] = [ 3.  6. 28. 34.]
141      cord_individul_obj[indivial_i, :] = [ 4.  4. 42. 46.]
142      cord_individul_obj[indivial_i, :] = [ 5.  5. 16. 21.]
143      cord_individul_obj[indivial_i, :] = [ 6.  5. 16. 21.]
144      cord_individul_obj[indivial_i, :] = [ 7.  5. 32. 37.]
145      cord_individul_obj[indivial_i, :] = [ 8.  6. 20. 26.]
146      cord_individul_obj[indivial_i, :] = [ 9.  5. 16. 21.]
147      cord_individul_obj[indivial_i, :] = [10.  6. 16. 22.]
148      cord_individul_obj[indivial_i, :] = [11.  5. 38. 43.]
149      cord_individul_obj[indivial_i, :] = [12.  4. 28. 32.]
150      cord_individul_obj[indivial_i, :] = [13.  5. 16. 21.]
151      cord_individul_obj[indivial_i, :] = [14.  5. 36. 41.]
152
153      min(cord_individul_obj[:, 3]) =  21.0
154      historl_G_best_iter[iter, 3] =  21.0
155   Begin iteration:
156
157   iter =  6
158      cord_individul_obj[indivial_i, :] = [ 0.  5. 38. 43.]
159      cord_individul_obj[indivial_i, :] = [ 1.  5. 28. 33.]
160      cord_individul_obj[indivial_i, :] = [ 2.  5. 16. 21.]
161      cord_individul_obj[indivial_i, :] = [ 3.  6. 78. 84.]
162      cord_individul_obj[indivial_i, :] = [ 4.  5. 20. 25.]
163      cord_individul_obj[indivial_i, :] = [ 5.  5. 28. 33.]
```

```
164         cord_individul_obj[indivial_i, :] = [ 6.  6. 60. 66.]
165         cord_individul_obj[indivial_i, :] = [ 7.  5. 48. 53.]
166         cord_individul_obj[indivial_i, :] = [ 8.  6. 34. 40.]
167         cord_individul_obj[indivial_i, :] = [ 9.  5. 28. 33.]
168         cord_individul_obj[indivial_i, :] = [10.  6. 42. 48.]
169         cord_individul_obj[indivial_i, :] = [11.  5. 32. 37.]
170         cord_individul_obj[indivial_i, :] = [12.  4. 34. 38.]
171         cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
172         cord_individul_obj[indivial_i, :] = [14.  6. 28. 34.]
173
174     min(cord_individul_obj[:, 3]) =  21.0
175     historl_G_best_iter[iter, 3] =  21.0
176  Begin iteration:
177
178  iter =  7
179         cord_individul_obj[indivial_i, :] = [ 0.  6. 32. 38.]
180         cord_individul_obj[indivial_i, :] = [ 1.  5. 16. 21.]
181         cord_individul_obj[indivial_i, :] = [ 2.  6. 74. 80.]
182         cord_individul_obj[indivial_i, :] = [ 3.  5. 16. 21.]
183         cord_individul_obj[indivial_i, :] = [ 4.  5. 20. 25.]
184         cord_individul_obj[indivial_i, :] = [ 5.  4. 28. 32.]
185         cord_individul_obj[indivial_i, :] = [ 6.  6. 50. 56.]
186         cord_individul_obj[indivial_i, :] = [ 7.  6. 38. 44.]
187         cord_individul_obj[indivial_i, :] = [ 8.  6. 28. 34.]
188         cord_individul_obj[indivial_i, :] = [ 9.  5. 16. 21.]
189         cord_individul_obj[indivial_i, :] = [10.  6. 16. 22.]
190         cord_individul_obj[indivial_i, :] = [11.  5. 38. 43.]
191         cord_individul_obj[indivial_i, :] = [12.  5. 16. 21.]
192         cord_individul_obj[indivial_i, :] = [13.  5. 16. 21.]
193         cord_individul_obj[indivial_i, :] = [14.  5. 36. 41.]
194
195     min(cord_individul_obj[:, 3]) =  21.0
196     historl_G_best_iter[iter, 3] =  21.0
197  Begin iteration:
198
199  iter =  8
200         cord_individul_obj[indivial_i, :] = [ 0.  6. 48. 54.]
201         cord_individul_obj[indivial_i, :] = [ 1.  5. 28. 33.]
202         cord_individul_obj[indivial_i, :] = [ 2.  5. 16. 21.]
203         cord_individul_obj[indivial_i, :] = [ 3.  6. 42. 48.]
204         cord_individul_obj[indivial_i, :] = [ 4.  4. 34. 38.]
205         cord_individul_obj[indivial_i, :] = [ 5.  4. 34. 38.]
206         cord_individul_obj[indivial_i, :] = [ 6.  6. 34. 40.]
207         cord_individul_obj[indivial_i, :] = [ 7.  6. 32. 38.]
208         cord_individul_obj[indivial_i, :] = [ 8.  6. 32. 38.]
209         cord_individul_obj[indivial_i, :] = [ 9.  4. 34. 38.]
210         cord_individul_obj[indivial_i, :] = [10.  6. 60. 66.]
211         cord_individul_obj[indivial_i, :] = [11.  5. 38. 43.]
212         cord_individul_obj[indivial_i, :] = [12.  5. 28. 33.]
213         cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
214         cord_individul_obj[indivial_i, :] = [14.  6. 60. 66.]
215
216     min(cord_individul_obj[:, 3]) =  21.0
217     historl_G_best_iter[iter, 3] =  21.0
218  Begin iteration:
219
220  iter =  9
221         cord_individul_obj[indivial_i, :] = [ 0.  6. 32. 38.]
222         cord_individul_obj[indivial_i, :] = [ 1.  5. 16. 21.]
223         cord_individul_obj[indivial_i, :] = [ 2.  6. 48. 54.]
224         cord_individul_obj[indivial_i, :] = [ 3.  6. 16. 22.]
225         cord_individul_obj[indivial_i, :] = [ 4.  5. 20. 25.]
226         cord_individul_obj[indivial_i, :] = [ 5.  5. 16. 21.]
227         cord_individul_obj[indivial_i, :] = [ 6.  6. 36. 42.]
228         cord_individul_obj[indivial_i, :] = [ 7.  6. 48. 54.]
229         cord_individul_obj[indivial_i, :] = [ 8.  6. 48. 54.]
230         cord_individul_obj[indivial_i, :] = [ 9.  5. 16. 21.]
231         cord_individul_obj[indivial_i, :] = [10.  5. 16. 21.]
232         cord_individul_obj[indivial_i, :] = [11.  5. 32. 37.]
233         cord_individul_obj[indivial_i, :] = [12.  5. 16. 21.]
234         cord_individul_obj[indivial_i, :] = [13.  5. 16. 21.]
235         cord_individul_obj[indivial_i, :] = [14.  6. 36. 42.]
236
237     min(cord_individul_obj[:, 3]) =  21.0
238     historl_G_best_iter[iter, 3] =  21.0
239  Begin iteration:
240
241  iter =  10
242         cord_individul_obj[indivial_i, :] = [ 0.  6. 48. 54.]
243         cord_individul_obj[indivial_i, :] = [ 1.  5. 28. 33.]
244         cord_individul_obj[indivial_i, :] = [ 2.  5. 16. 21.]
245         cord_individul_obj[indivial_i, :] = [ 3.  6. 50. 56.]
246         cord_individul_obj[indivial_i, :] = [ 4.  4. 42. 46.]
247         cord_individul_obj[indivial_i, :] = [ 5.  4. 34. 38.]
```

```
248        cord_individul_obj[indivial_i, :] = [ 6.  6. 28. 34.]
249        cord_individul_obj[indivial_i, :] = [ 7.  6. 32. 38.]
250        cord_individul_obj[indivial_i, :] = [ 8.  6. 32. 38.]
251        cord_individul_obj[indivial_i, :] = [ 9.  5. 28. 33.]
252        cord_individul_obj[indivial_i, :] = [10.  6. 60. 66.]
253        cord_individul_obj[indivial_i, :] = [11.  5. 32. 37.]
254        cord_individul_obj[indivial_i, :] = [12.  5. 28. 33.]
255        cord_individul_obj[indivial_i, :] = [13.  5. 28. 33.]
256        cord_individul_obj[indivial_i, :] = [14.  6. 60. 66.]
257
258      min(cord_individul_obj[:, 3]) =  21.0
259      historl_G_best_iter[iter, 3] =  21.0
260  Iteration calculate over
261
262
263
264
265  All item are in Bin and:
266      Bin area =  1080
267      Real_area =  108.0
268      Proportion_of_area =  0.1
269        BEST_CHROM =
270          berth:  [14.5  3.   9.  26.5 18.5 22. ]
271          time:  [0. 0. 0. 0. 0. 0.]
272          num_QC:  [3. 3. 3. 2. 2. 2.]
273      Objective function values and some other indicators:
274        Obj0 = 5.00              Obj1 = 16.00          Obj0 + Obj1 = 21.00
275        Total movement of crane: 16.00
276        Total waiting time in berth position: 0.00
277        Total index of q during berthing: 629.00
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: 3.0   bow of i: 0.0   tail of i: 6.0   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: 120.0   work load_i: 120.0   work load gap_i: 0

281   V_id: 2   li: 6.0   xi: 9.0   bow of i: 6.0   tail of i: 12.0   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: 260.0   work load_i: 260.0   work load gap_i: 0

282   V_id: 3   li: 5.0   xi: 26.5   bow of i: 24.0   tail of i: 29.0   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: 18.5   bow of i: 17.0   tail of i: 20.0   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: 22.0   bow of i: 20.0   tail of i: 24.0   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: 233 s
287  End
288
```