```
 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=12126
 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          Trail =  24
23          maxlter_num =  10
24          W_inertia =  2.0
25          oder_type_num =  15
26          c1 =  1.0
27          c2 =  1.5
28          r1 =  0.30218819480169823
29          r2 =  0.30218819480169823
30  Begin iteration:
31
32  iter =  0
33          cord_individul_obj[indivial_i, :] = [ 0.  5. 34. 39.]
34          cord_individul_obj[indivial_i, :] = [ 1.  4. 68. 72.]
35          cord_individul_obj[indivial_i, :] = [ 2.  3.  8. 11.]
36          cord_individul_obj[indivial_i, :] = [ 3.  4. 28. 32.]
37          cord_individul_obj[indivial_i, :] = [ 4.   5.  98. 103.]
38          cord_individul_obj[indivial_i, :] = [ 5.  5. 94. 99.]
39          cord_individul_obj[indivial_i, :] = [ 6.  5. 64. 69.]
40          cord_individul_obj[indivial_i, :] = [ 7.  5. 72. 77.]
41          cord_individul_obj[indivial_i, :] = [ 8.  6. 62. 68.]
42          cord_individul_obj[indivial_i, :] = [ 9.  3. 12. 15.]
43          cord_individul_obj[indivial_i, :] = [10.  3. 68. 71.]
44          cord_individul_obj[indivial_i, :] = [11.  6. 16. 22.]
45          cord_individul_obj[indivial_i, :] = [12.  6. 64. 70.]
46          cord_individul_obj[indivial_i, :] = [ 13.   3. 114. 117.]
47          cord_individul_obj[indivial_i, :] = [14.  6. 64. 70.]
48
49      min(cord_individul_obj[:, 3]) = 11.0
50      historl_G_best_iter[iter, 3] = 11.0
51  Begin iteration:
52
53  iter =  1
54          cord_individul_obj[indivial_i, :] = [ 0.   4. 112. 116.]
55          cord_individul_obj[indivial_i, :] = [ 1.  5. 38. 43.]
56          cord_individul_obj[indivial_i, :] = [ 2.   4. 178. 182.]
57          cord_individul_obj[indivial_i, :] = [ 3.  3. 76. 79.]
58          cord_individul_obj[indivial_i, :] = [ 4.  3. 24. 27.]
59          cord_individul_obj[indivial_i, :] = [ 5.   3. 114. 117.]
60          cord_individul_obj[indivial_i, :] = [ 6.  5. 64. 69.]
61          cord_individul_obj[indivial_i, :] = [ 7.  4. 54. 58.]
62          cord_individul_obj[indivial_i, :] = [ 8.  5. 40. 45.]
63          cord_individul_obj[indivial_i, :] = [ 9.  4. 68. 72.]
64          cord_individul_obj[indivial_i, :] = [ 10.   4. 180. 184.]
65          cord_individul_obj[indivial_i, :] = [ 11.   5. 102. 107.]
66          cord_individul_obj[indivial_i, :] = [12.  3. 96. 99.]
67          cord_individul_obj[indivial_i, :] = [13.  3.  8. 11.]
68          cord_individul_obj[indivial_i, :] = [14.  3. 54. 57.]
69
70      min(cord_individul_obj[:, 3]) = 11.0
71      historl_G_best_iter[iter, 3] = 11.0
72  Begin iteration:
73
74  iter =  2
75          cord_individul_obj[indivial_i, :] = [ 0.   4. 122. 126.]
76          cord_individul_obj[indivial_i, :] = [ 1.  5. 62. 67.]
77          cord_individul_obj[indivial_i, :] = [ 2.   4. 112. 116.]
78          cord_individul_obj[indivial_i, :] = [ 3.   4.  96. 100.]
79          cord_individul_obj[indivial_i, :] = [ 4.  3. 36. 39.]
```

```
 80        cord_individul_obj[indivial_i, :] = [ 5.  4. 130. 134.]
 81        cord_individul_obj[indivial_i, :] = [ 6.  3. 86. 89.]
 82        cord_individul_obj[indivial_i, :] = [ 7.  4.  8. 12.]
 83        cord_individul_obj[indivial_i, :] = [ 8.  3. 88. 91.]
 84        cord_individul_obj[indivial_i, :] = [ 9.  4. 60. 64.]
 85        cord_individul_obj[indivial_i, :] = [10.  3.  8. 11.]
 86        cord_individul_obj[indivial_i, :] = [ 11.  5. 96. 101.]
 87        cord_individul_obj[indivial_i, :] = [12.  3. 96. 99.]
 88        cord_individul_obj[indivial_i, :] = [ 13.  5. 106. 111.]
 89        cord_individul_obj[indivial_i, :] = [14.  4. 80. 84.]
 90
 91     min(cord_individul_obj[:, 3]) = 11.0
 92     historl_G_best_iter[iter, 3] = 11.0
 93  Begin iteration:
 94
 95  iter = 3
 96        cord_individul_obj[indivial_i, :] = [ 0.  3. 92. 95.]
 97        cord_individul_obj[indivial_i, :] = [ 1.  3. 24. 27.]
 98        cord_individul_obj[indivial_i, :] = [ 2.  4. 146. 150.]
 99        cord_individul_obj[indivial_i, :] = [ 3.  4. 58. 62.]
100        cord_individul_obj[indivial_i, :] = [ 4.  4. 48. 52.]
101        cord_individul_obj[indivial_i, :] = [ 5.  3.  8. 11.]
102        cord_individul_obj[indivial_i, :] = [ 6.  5. 46. 51.]
103        cord_individul_obj[indivial_i, :] = [ 7.  3. 100. 103.]
104        cord_individul_obj[indivial_i, :] = [ 8.  5. 40. 45.]
105        cord_individul_obj[indivial_i, :] = [ 9.  3. 36. 39.]
106        cord_individul_obj[indivial_i, :] = [10.  4. 88. 92.]
107        cord_individul_obj[indivial_i, :] = [11.  5. 40. 45.]
108        cord_individul_obj[indivial_i, :] = [ 12.  3. 136. 139.]
109        cord_individul_obj[indivial_i, :] = [13.  4. 84. 88.]
110        cord_individul_obj[indivial_i, :] = [ 14.  3. 146. 149.]
111
112     min(cord_individul_obj[:, 3]) = 11.0
113     historl_G_best_iter[iter, 3] = 11.0
114  Begin iteration:
115
116  iter = 4
117        cord_individul_obj[indivial_i, :] = [ 0.  4. 84. 88.]
118        cord_individul_obj[indivial_i, :] = [ 1.  5. 26. 31.]
119        cord_individul_obj[indivial_i, :] = [ 2.  3.  8. 11.]
120        cord_individul_obj[indivial_i, :] = [ 3.  4. 26. 30.]
121        cord_individul_obj[indivial_i, :] = [ 4.  3. 50. 53.]
122        cord_individul_obj[indivial_i, :] = [ 5.  4. 38. 42.]
123        cord_individul_obj[indivial_i, :] = [ 6.  6. 40. 46.]
124        cord_individul_obj[indivial_i, :] = [ 7.  4. 120. 124.]
125        cord_individul_obj[indivial_i, :] = [ 8.  4. 108. 112.]
126        cord_individul_obj[indivial_i, :] = [ 9.  4. 68. 72.]
127        cord_individul_obj[indivial_i, :] = [10.  4. 86. 90.]
128        cord_individul_obj[indivial_i, :] = [ 11.  5. 104. 109.]
129        cord_individul_obj[indivial_i, :] = [12.  3. 84. 87.]
130        cord_individul_obj[indivial_i, :] = [13.  5. 76. 81.]
131        cord_individul_obj[indivial_i, :] = [14.  3. 80. 83.]
132
133     min(cord_individul_obj[:, 3]) = 11.0
134     historl_G_best_iter[iter, 3] = 11.0
135  Begin iteration:
136
137  iter = 5
138        cord_individul_obj[indivial_i, :] = [ 0.  4. 100. 104.]
139        cord_individul_obj[indivial_i, :] = [ 1.  5. 44. 49.]
140        cord_individul_obj[indivial_i, :] = [ 2.  4. 178. 182.]
141        cord_individul_obj[indivial_i, :] = [ 3.  4. 18. 22.]
142        cord_individul_obj[indivial_i, :] = [ 4.  4. 54. 58.]
143        cord_individul_obj[indivial_i, :] = [ 5.  4.  8. 12.]
144        cord_individul_obj[indivial_i, :] = [ 6.  6. 44. 50.]
145        cord_individul_obj[indivial_i, :] = [ 7.  3.  8. 11.]
146        cord_individul_obj[indivial_i, :] = [ 8.  4. 90. 94.]
147        cord_individul_obj[indivial_i, :] = [ 9.  4. 108. 112.]
148        cord_individul_obj[indivial_i, :] = [ 10.  3. 136. 139.]
149        cord_individul_obj[indivial_i, :] = [ 11.  5. 140. 145.]
150        cord_individul_obj[indivial_i, :] = [12.  3. 84. 87.]
151        cord_individul_obj[indivial_i, :] = [ 13.  3. 112. 115.]
152        cord_individul_obj[indivial_i, :] = [14.  3. 80. 83.]
153
154     min(cord_individul_obj[:, 3]) = 11.0
155     historl_G_best_iter[iter, 3] = 11.0
156  Begin iteration:
157
158  iter = 6
159        cord_individul_obj[indivial_i, :] = [ 0.  6. 48. 54.]
160        cord_individul_obj[indivial_i, :] = [ 1.  3. 58. 61.]
161        cord_individul_obj[indivial_i, :] = [ 2.  3.  8. 11.]
162        cord_individul_obj[indivial_i, :] = [ 3.  4. 12. 16.]
163        cord_individul_obj[indivial_i, :] = [ 4.  4. 86. 90.]
```

```
164        cord_individul_obj[indivial_i, :] = [ 5.  4. 166. 170.]
165        cord_individul_obj[indivial_i, :] = [ 6.  3. 54. 57.]
166        cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
167        cord_individul_obj[indivial_i, :] = [ 8.  5. 62. 67.]
168        cord_individul_obj[indivial_i, :] = [ 9.  3. 116. 119.]
169        cord_individul_obj[indivial_i, :] = [10.  4. 66. 70.]
170        cord_individul_obj[indivial_i, :] = [ 11.  5. 136. 141.]
171        cord_individul_obj[indivial_i, :] = [12.  3.  8. 11.]
172        cord_individul_obj[indivial_i, :] = [13.  3. 92. 95.]
173        cord_individul_obj[indivial_i, :] = [14.  4. 88. 92.]
174
175      min(cord_individul_obj[:, 3]) =  11.0
176        historl_G_best_iter[iter, 3] =  11.0
177  Begin iteration:
178
179  iter =  7
180        cord_individul_obj[indivial_i, :] = [ 0.  6. 128. 134.]
181        cord_individul_obj[indivial_i, :] = [ 1.  4. 54. 58.]
182        cord_individul_obj[indivial_i, :] = [ 2.  4. 112. 116.]
183        cord_individul_obj[indivial_i, :] = [3.  4. 44. 48.]
184        cord_individul_obj[indivial_i, :] = [ 4.  4. 84. 88.]
185        cord_individul_obj[indivial_i, :] = [ 5.  3.  8. 11.]
186        cord_individul_obj[indivial_i, :] = [ 6.  3. 114. 117.]
187        cord_individul_obj[indivial_i, :] = [ 7.  4. 18. 22.]
188        cord_individul_obj[indivial_i, :] = [ 8.  5. 34. 39.]
189        cord_individul_obj[indivial_i, :] = [ 9.  4. 124. 128.]
190        cord_individul_obj[indivial_i, :] = [10.  4. 82. 86.]
191        cord_individul_obj[indivial_i, :] = [ 11.  3. 146. 149.]
192        cord_individul_obj[indivial_i, :] = [12.  3. 32. 35.]
193        cord_individul_obj[indivial_i, :] = [13.  4. 90. 94.]
194        cord_individul_obj[indivial_i, :] = [14.  3. 80. 83.]
195
196      min(cord_individul_obj[:, 3]) =  11.0
197        historl_G_best_iter[iter, 3] =  11.0
198  Begin iteration:
199
200  iter =  8
201        cord_individul_obj[indivial_i, :] = [ 0.  6. 60. 66.]
202        cord_individul_obj[indivial_i, :] = [ 1.  5. 68. 73.]
203        cord_individul_obj[indivial_i, :] = [ 2.  4. 146. 150.]
204        cord_individul_obj[indivial_i, :] = [ 3.  4. 38. 42.]
205        cord_individul_obj[indivial_i, :] = [ 4.  3. 120. 123.]
206        cord_individul_obj[indivial_i, :] = [ 5.  4. 38. 42.]
207        cord_individul_obj[indivial_i, :] = [ 6.  5. 16. 21.]
208        cord_individul_obj[indivial_i, :] = [ 7.  4. 24. 28.]
209        cord_individul_obj[indivial_i, :] = [ 8.  5. 22. 27.]
210        cord_individul_obj[indivial_i, :] = [ 9.  3. 118. 121.]
211        cord_individul_obj[indivial_i, :] = [10.  4. 54. 58.]
212        cord_individul_obj[indivial_i, :] = [11.  3.  8. 11.]
213        cord_individul_obj[indivial_i, :] = [12.  3. 80. 83.]
214        cord_individul_obj[indivial_i, :] = [ 13.  3. 100. 103.]
215        cord_individul_obj[indivial_i, :] = [ 14.  3. 102. 105.]
216
217      min(cord_individul_obj[:, 3]) =  11.0
218        historl_G_best_iter[iter, 3] =  11.0
219  Begin iteration:
220
221  iter =  9
222        cord_individul_obj[indivial_i, :] = [ 0.  6. 34. 40.]
223        cord_individul_obj[indivial_i, :] = [ 1.  6. 18. 24.]
224        cord_individul_obj[indivial_i, :] = [ 2.  3.  8. 11.]
225        cord_individul_obj[indivial_i, :] = [ 3.  3. 128. 131.]
226        cord_individul_obj[indivial_i, :] = [ 4.  4. 108. 112.]
227        cord_individul_obj[indivial_i, :] = [ 5.  3.  8. 11.]
228        cord_individul_obj[indivial_i, :] = [ 6.  6. 46. 52.]
229        cord_individul_obj[indivial_i, :] = [ 7.  4. 126. 130.]
230        cord_individul_obj[indivial_i, :] = [ 8.  6. 16. 22.]
231        cord_individul_obj[indivial_i, :] = [ 9.  3. 122. 125.]
232        cord_individul_obj[indivial_i, :] = [ 10.  4. 130. 134.]
233        cord_individul_obj[indivial_i, :] = [ 11.  5. 102. 107.]
234        cord_individul_obj[indivial_i, :] = [12.  3. 80. 83.]
235        cord_individul_obj[indivial_i, :] = [13.  4. 74. 78.]
236        cord_individul_obj[indivial_i, :] = [14.  3. 80. 83.]
237
238      min(cord_individul_obj[:, 3]) =  11.0
239        historl_G_best_iter[iter, 3] =  11.0
240  Begin iteration:
241
242  iter =  10
243        cord_individul_obj[indivial_i, :] = [ 0.  4. 88. 92.]
244        cord_individul_obj[indivial_i, :] = [ 1.  5. 80. 85.]
245        cord_individul_obj[indivial_i, :] = [ 2.  4. 112. 116.]
246        cord_individul_obj[indivial_i, :] = [ 3.  4. 100. 104.]
247        cord_individul_obj[indivial_i, :] = [ 4.  4. 32. 36.]
```

```
248        cord_individul_obj[indivial_i, :] = [ 5.  4. 96. 100.]
249        cord_individul_obj[indivial_i, :] = [ 6.  3. 90. 93.]
250        cord_individul_obj[indivial_i, :] = [ 7.  3.  8. 11.]
251        cord_individul_obj[indivial_i, :] = [ 8.  5. 80. 85.]
252        cord_individul_obj[indivial_i, :] = [ 9.  4. 80. 84.]
253        cord_individul_obj[indivial_i, :] = [10.  3.  8. 11.]
254        cord_individul_obj[indivial_i, :] = [ 11.  5. 96. 101.]
255        cord_individul_obj[indivial_i, :] = [12.  3. 84. 87.]
256        cord_individul_obj[indivial_i, :] = [13.  4. 86. 90.]
257        cord_individul_obj[indivial_i, :] = [14.  3. 80. 83.]
258
259     min(cord_individul_obj[:, 3]) =  11.0
260     historl_G_best_iter[iter, 3] =  11.0
261   Iteration calculate over
262
263
264
265
266   All item are in Bin and:
267      Bin area =  1080
268      Real_area =  84.0
269      Proportion_of_area =  0.07777777777777778
270      BEST_CHROM =
271        berth:  [ 5.5 26.  20.  14.5  1.5 10. ]
272        time:  [0. 0. 0. 0. 0. 0.]
273        num_QC:  [4. 2. 4. 3. 3. 3.]
274      Objective function values and some other indicators:
275        Obj0 = 3.00           Obj1 = 8.00           Obj0 + Obj1 = 11.00
276        Total movement of crane: 8.00
277        Total waiting time in berth position: 0.00
278        Total index of q during berthing: 544.00
279      Specific arrangement for each vessel:
280        V_id: 0           li: 5.0           xi: 5.5           bow of i: 3.0           tail of i: 8.0           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 load_i:
           80.0           work load gap_i: 0
281        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
282        V_id: 2           li: 6.0           xi: 20.0           bow of i: 17.0           tail of i: 23.0           gama_i0: 0.0           gama_i1: 3
           .0           gama_i1 + 1: 4.0           gama_i1 - gama_i0: 3.0           duration_time_i: 4.0           demand_i: 260.0           work
           load_i: 260.0           work load gap_i: 0
283        V_id: 3           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
284        V_id: 4           li: 3.0           xi: 1.5           bow of i: 0.0           tail of i: 3.0           gama_i0: 0.0           gama_i1: 3.0
                 gama_i1 + 1: 4.0           gama_i1 - gama_i0: 3.0           duration_time_i: 4.0           demand_i: 200.0           work load_i:
           200.0           work load gap_i: 0
285        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: 3
           .0           gama_i1 + 1: 4.0           gama_i1 - gama_i0: 3.0           duration_time_i: 4.0           demand_i: 220.0           work
           load_i: 220.0           work load gap_i: 0
286
287   Algorithm finished and the total CPU time: 61 s
288   End
289
```