```
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=4027
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 =  30
23       maxlter_num =  10
24       W_inertia =  0.5
25       oder_type_num =  10
26       c1 =  2.0
27       c2 =  2.0
28       r1 =  0.7310935644446019
29       r2 =  0.7310935644446019
30 Begin iteration:
31
32 iter =  0
33       cord_individul_obj[indivial_i, :] = [ 0.  3. 78. 81.]
34       cord_individul_obj[indivial_i, :] = [ 1.  5. 48. 53.]
35       cord_individul_obj[indivial_i, :] = [ 2.  3. 62. 65.]
36       cord_individul_obj[indivial_i, :] = [ 3.  3. 74. 77.]
37       cord_individul_obj[indivial_i, :] = [ 4.  6.  8. 14.]
38       cord_individul_obj[indivial_i, :] = [ 5.  5. 70. 75.]
39       cord_individul_obj[indivial_i, :] = [ 6.  4. 96. 100.]
40       cord_individul_obj[indivial_i, :] = [ 7.  5. 66. 71.]
41       cord_individul_obj[indivial_i, :] = [ 8.  4. 110. 114.]
42       cord_individul_obj[indivial_i, :] = [ 9.  4. 50. 54.]
43
44    min(cord_individul_obj[:, 3]) =  14.0
45    historl_G_best_iter[iter, 3] =  14.0
46 Begin iteration:
47
48 iter =  1
49       cord_individul_obj[indivial_i, :] = [ 0.  4. 50. 54.]
50       cord_individul_obj[indivial_i, :] = [ 1.  5. 72. 77.]
51       cord_individul_obj[indivial_i, :] = [ 2.  3. 80. 83.]
52       cord_individul_obj[indivial_i, :] = [ 3.  4. 106. 110.]
53       cord_individul_obj[indivial_i, :] = [ 4.  6. 110. 116.]
54       cord_individul_obj[indivial_i, :] = [ 5.  5. 12. 17.]
55       cord_individul_obj[indivial_i, :] = [ 6.  6. 50. 56.]
56       cord_individul_obj[indivial_i, :] = [ 7.  6. 16. 22.]
57       cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
58       cord_individul_obj[indivial_i, :] = [ 9.  5. 28. 33.]
59
60    min(cord_individul_obj[:, 3]) =  14.0
61    historl_G_best_iter[iter, 3] =  14.0
62 Begin iteration:
63
64 iter =  2
65       cord_individul_obj[indivial_i, :] = [ 0.  3. 68. 71.]
66       cord_individul_obj[indivial_i, :] = [ 1.  5. 32. 37.]
67       cord_individul_obj[indivial_i, :] = [ 2.  3. 36. 39.]
68       cord_individul_obj[indivial_i, :] = [ 3.  3. 156. 159.]
69       cord_individul_obj[indivial_i, :] = [ 4.  6.  8. 14.]
70       cord_individul_obj[indivial_i, :] = [ 5.  6. 12. 18.]
71       cord_individul_obj[indivial_i, :] = [ 6.  6. 58. 64.]
72       cord_individul_obj[indivial_i, :] = [ 7.  4. 32. 36.]
73       cord_individul_obj[indivial_i, :] = [ 8.  6. 12. 18.]
74       cord_individul_obj[indivial_i, :] = [ 9.  5. 22. 27.]
75
76    min(cord_individul_obj[:, 3]) =  14.0
77    historl_G_best_iter[iter, 3] =  14.0
78 Begin iteration:
79
```

```
 80  iter = 3
 81      cord_individul_obj[indivial_i, :] = [ 0.  4. 18. 22.]
 82      cord_individul_obj[indivial_i, :] = [ 1.  3. 28. 31.]
 83      cord_individul_obj[indivial_i, :] = [ 2.   6. 102. 108.]
 84      cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
 85      cord_individul_obj[indivial_i, :] = [ 4.  6. 36. 42.]
 86      cord_individul_obj[indivial_i, :] = [ 5.  6. 12. 18.]
 87      cord_individul_obj[indivial_i, :] = [ 6.  6. 64. 70.]
 88      cord_individul_obj[indivial_i, :] = [ 7.  5. 12. 17.]
 89      cord_individul_obj[indivial_i, :] = [ 8.  6. 24. 30.]
 90      cord_individul_obj[indivial_i, :] = [ 9.  3. 18. 21.]
 91
 92      min(cord_individul_obj[:, 3]) = 14.0
 93      historl_G_best_iter[iter, 3] = 14.0
 94  Begin iteration:
 95
 96  iter = 4
 97      cord_individul_obj[indivial_i, :] = [ 0.  4.  8. 12.]
 98      cord_individul_obj[indivial_i, :] = [ 1.  4. 86. 90.]
 99      cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
100      cord_individul_obj[indivial_i, :] = [ 3.  6. 76. 82.]
101      cord_individul_obj[indivial_i, :] = [ 4.  6. 14. 20.]
102      cord_individul_obj[indivial_i, :] = [ 5.  6. 14. 20.]
103      cord_individul_obj[indivial_i, :] = [ 6.  6. 74. 80.]
104      cord_individul_obj[indivial_i, :] = [ 7.  6. 54. 60.]
105      cord_individul_obj[indivial_i, :] = [ 8.  6. 14. 20.]
106      cord_individul_obj[indivial_i, :] = [ 9.  5. 50. 55.]
107
108      min(cord_individul_obj[:, 3]) = 12.0
109      historl_G_best_iter[iter, 3] = 12.0
110  Begin iteration:
111
112  iter = 5
113      cord_individul_obj[indivial_i, :] = [ 0.  4. 18. 22.]
114      cord_individul_obj[indivial_i, :] = [ 1.  4.  8. 12.]
115      cord_individul_obj[indivial_i, :] = [ 2.  6. 12. 18.]
116      cord_individul_obj[indivial_i, :] = [ 3.  6. 54. 60.]
117      cord_individul_obj[indivial_i, :] = [ 4.  6. 80. 86.]
118      cord_individul_obj[indivial_i, :] = [ 5.  6. 84. 90.]
119      cord_individul_obj[indivial_i, :] = [ 6.  6. 64. 70.]
120      cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
121      cord_individul_obj[indivial_i, :] = [ 8.  6. 24. 30.]
122      cord_individul_obj[indivial_i, :] = [ 9.  3. 48. 51.]
123
124      min(cord_individul_obj[:, 3]) = 12.0
125      historl_G_best_iter[iter, 3] = 12.0
126  Begin iteration:
127
128  iter = 6
129      cord_individul_obj[indivial_i, :] = [ 0.  3. 90. 93.]
130      cord_individul_obj[indivial_i, :] = [ 1.  4. 46. 50.]
131      cord_individul_obj[indivial_i, :] = [ 2.  4.  8. 12.]
132      cord_individul_obj[indivial_i, :] = [ 3.  4. 12. 16.]
133      cord_individul_obj[indivial_i, :] = [ 4.  4. 24. 28.]
134      cord_individul_obj[indivial_i, :] = [ 5.  4.  8. 12.]
135      cord_individul_obj[indivial_i, :] = [ 6.  4. 12. 16.]
136      cord_individul_obj[indivial_i, :] = [ 7.  5. 12. 17.]
137      cord_individul_obj[indivial_i, :] = [ 8.  4. 12. 16.]
138      cord_individul_obj[indivial_i, :] = [ 9.  5. 12. 17.]
139
140      min(cord_individul_obj[:, 3]) = 12.0
141      historl_G_best_iter[iter, 3] = 12.0
142  Begin iteration:
143
144  iter = 7
145      cord_individul_obj[indivial_i, :] = [ 0.  4.  8. 12.]
146      cord_individul_obj[indivial_i, :] = [ 1.  4. 18. 22.]
147      cord_individul_obj[indivial_i, :] = [ 2.  4. 12. 16.]
148      cord_individul_obj[indivial_i, :] = [ 3.  4.  8. 12.]
149      cord_individul_obj[indivial_i, :] = [ 4.   4. 130. 134.]
150      cord_individul_obj[indivial_i, :] = [ 5.  4. 12. 16.]
151      cord_individul_obj[indivial_i, :] = [ 6.  4. 30. 34.]
152      cord_individul_obj[indivial_i, :] = [ 7.  6. 18. 24.]
153      cord_individul_obj[indivial_i, :] = [ 8.  4. 30. 34.]
154      cord_individul_obj[indivial_i, :] = [ 9.  5. 22. 27.]
155
156      min(cord_individul_obj[:, 3]) = 12.0
157      historl_G_best_iter[iter, 3] = 12.0
158  Begin iteration:
159
160  iter = 8
161      cord_individul_obj[indivial_i, :] = [ 0.  4. 12. 16.]
162      cord_individul_obj[indivial_i, :] = [ 1.  4. 18. 22.]
163      cord_individul_obj[indivial_i, :] = [ 2.  4. 18. 22.]
```

```
164        cord_individul_obj[indivial_i, :] = [ 3.  4. 18. 22.]
165        cord_individul_obj[indivial_i, :] = [ 4.  4.  8. 12.]
166        cord_individul_obj[indivial_i, :] = [ 5.  6.  8. 14.]
167        cord_individul_obj[indivial_i, :] = [ 6.  4. 104. 108.]
168        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
169        cord_individul_obj[indivial_i, :] = [ 8.  4. 50. 54.]
170        cord_individul_obj[indivial_i, :] = [ 9.  5. 54. 59.]
171
172     min(cord_individul_obj[:, 3]) = 12.0
173     historl_G_best_iter[iter, 3] = 12.0
174  Begin iteration:
175
176  iter = 9
177        cord_individul_obj[indivial_i, :] = [ 0.  4. 12. 16.]
178        cord_individul_obj[indivial_i, :] = [ 1.  4. 18. 22.]
179        cord_individul_obj[indivial_i, :] = [ 2.  4. 12. 16.]
180        cord_individul_obj[indivial_i, :] = [ 3.  4. 28. 32.]
181        cord_individul_obj[indivial_i, :] = [ 4.  4. 28. 32.]
182        cord_individul_obj[indivial_i, :] = [ 5.  6. 24. 30.]
183        cord_individul_obj[indivial_i, :] = [ 6.  4.  8. 12.]
184        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
185        cord_individul_obj[indivial_i, :] = [ 8.  4. 12. 16.]
186        cord_individul_obj[indivial_i, :] = [ 9.  5. 22. 27.]
187
188     min(cord_individul_obj[:, 3]) = 12.0
189     historl_G_best_iter[iter, 3] = 12.0
190  Begin iteration:
191
192  iter = 10
193        cord_individul_obj[indivial_i, :] = [ 0.  4. 12. 16.]
194        cord_individul_obj[indivial_i, :] = [ 1.  4. 28. 32.]
195        cord_individul_obj[indivial_i, :] = [ 2.  4. 12. 16.]
196        cord_individul_obj[indivial_i, :] = [ 3.  4.  8. 12.]
197        cord_individul_obj[indivial_i, :] = [ 4.  4. 12. 16.]
198        cord_individul_obj[indivial_i, :] = [ 5.  6. 36. 42.]
199        cord_individul_obj[indivial_i, :] = [ 6.  4. 60. 64.]
200        cord_individul_obj[indivial_i, :] = [ 7.  6. 12. 18.]
201        cord_individul_obj[indivial_i, :] = [ 8.  4. 28. 32.]
202        cord_individul_obj[indivial_i, :] = [ 9.  5. 12. 17.]
203
204     min(cord_individul_obj[:, 3]) = 12.0
205     historl_G_best_iter[iter, 3] = 12.0
206  Iteration calculate over
207
208
209
210
211  All item are in Bin and:
212     Bin area = 1080
213     Real_area = 98.0
214     Proportion_of_area = 0.09074074074074075
215       BEST_CHROM =
216         berth: [20.5 26.  6.  11.5 1.5 16. ]
217         time: [0. 0. 0. 0. 0. 0.]
218         num_QC: [2. 2. 3. 2. 2. 3.]
219     Objective function values and some other indicators:
220     Obj0 = 4.00          Obj1 = 8.00          Obj0 + Obj1 = 12.00
221     Total movement of crane: 8.00
222     Total waiting time in berth position: 0.00
223     Total index of q during berthing: 461.00
224     Specific arrangement for each vessel:
```

225  V_id: 0   li: 5.0   xi: 20.5   bow of i: 18.0   tail of i: 23.0   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

226  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

227  V_id: 2   li: 6.0   xi: 6.0   bow of i: 3.0   tail of i: 9.0   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

228  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: 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

229  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: 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

230  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: 3.0   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

```
231
232  Algorithm finished and the total CPU time: 50 s
233  End
234
```