```
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=53802
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 =  16
23        maxlter_num =  10
24        W_inertia =  0.5
25        oder_type_num =  10
26        c1 =  1.0
27        c2 =  1.0
28        r1 =  0.7333444494489252
29        r2 =  0.7333444494489252
30 Begin iteration:
31
32 iter =  0
33        cord_individul_obj[indivial_i, :] = [ 0.   3. 156. 159.]
34        cord_individul_obj[indivial_i, :] = [ 1.   3. 164. 167.]
35        cord_individul_obj[indivial_i, :] = [ 2.   3. 100. 103.]
36        cord_individul_obj[indivial_i, :] = [ 3.   3. 132. 135.]
37        cord_individul_obj[indivial_i, :] = [ 4. 3. 72. 75.]
38        cord_individul_obj[indivial_i, :] = [ 5.   3. 144. 147.]
39        cord_individul_obj[indivial_i, :] = [ 6. 3. 84. 87.]
40        cord_individul_obj[indivial_i, :] = [ 7.   3. 98. 101.]
41        cord_individul_obj[indivial_i, :] = [ 8.   3. 120. 123.]
42        cord_individul_obj[indivial_i, :] = [ 9.   3. 116. 119.]
43
44     min(cord_individul_obj[:, 3]) = 75.0
45     historl_G_best_iter[iter, 3] = 75.0
46 Begin iteration:
47
48 iter =  1
49        cord_individul_obj[indivial_i, :] = [ 0. 3. 70. 73.]
50        cord_individul_obj[indivial_i, :] = [ 1. 3. 72. 75.]
51        cord_individul_obj[indivial_i, :] = [ 2. 3. 52. 55.]
52        cord_individul_obj[indivial_i, :] = [ 3.   3. 124. 127.]
53        cord_individul_obj[indivial_i, :] = [ 4. 4. 70. 74.]
54        cord_individul_obj[indivial_i, :] = [ 5. 3. 70. 73.]
55        cord_individul_obj[indivial_i, :] = [ 6. 3. 96. 99.]
56        cord_individul_obj[indivial_i, :] = [ 7. 4. 66. 70.]
57        cord_individul_obj[indivial_i, :] = [ 8. 4. 72. 76.]
58        cord_individul_obj[indivial_i, :] = [ 9.   4. 100. 104.]
59
60     min(cord_individul_obj[:, 3]) = 55.0
61     historl_G_best_iter[iter, 3] = 55.0
62 Begin iteration:
63
64 iter =  2
65        cord_individul_obj[indivial_i, :] = [ 0. 5. 28. 33.]
66        cord_individul_obj[indivial_i, :] = [ 1. 5. 52. 57.]
67        cord_individul_obj[indivial_i, :] = [ 2. 5.  8. 13.]
68        cord_individul_obj[indivial_i, :] = [ 3. 3. 52. 55.]
69        cord_individul_obj[indivial_i, :] = [ 4. 4. 30. 34.]
70        cord_individul_obj[indivial_i, :] = [ 5. 5. 32. 37.]
71        cord_individul_obj[indivial_i, :] = [ 6. 3. 44. 47.]
72        cord_individul_obj[indivial_i, :] = [ 7. 4. 44. 48.]
73        cord_individul_obj[indivial_i, :] = [ 8. 4. 24. 28.]
74        cord_individul_obj[indivial_i, :] = [ 9. 4. 44. 48.]
75
76     min(cord_individul_obj[:, 3]) = 13.0
77     historl_G_best_iter[iter, 3] = 13.0
78 Begin iteration:
79
```

```
 80  iter =  3
 81      cord_individul_obj[indivial_i, :] = [ 0.   3. 100. 103.]
 82      cord_individul_obj[indivial_i, :] = [ 1.  5.  8. 13.]
 83      cord_individul_obj[indivial_i, :] = [ 2.   3. 130. 133.]
 84      cord_individul_obj[indivial_i, :] = [ 3.  3. 24. 27.]
 85      cord_individul_obj[indivial_i, :] = [ 4.  3. 74. 77.]
 86      cord_individul_obj[indivial_i, :] = [ 5.  3. 52. 55.]
 87      cord_individul_obj[indivial_i, :] = [ 6.  3. 20. 23.]
 88      cord_individul_obj[indivial_i, :] = [ 7.  4. 28. 32.]
 89      cord_individul_obj[indivial_i, :] = [ 8.  4. 64. 68.]
 90      cord_individul_obj[indivial_i, :] = [ 9.  6. 54. 60.]
 91
 92      min(cord_individul_obj[:, 3]) =  13.0
 93      historl_G_best_iter[iter, 3] =  13.0
 94  Begin iteration:
 95
 96  iter =  4
 97      cord_individul_obj[indivial_i, :] = [ 0.  3. 48. 51.]
 98      cord_individul_obj[indivial_i, :] = [ 1.  4. 62. 66.]
 99      cord_individul_obj[indivial_i, :] = [ 2.  5.  8. 13.]
100      cord_individul_obj[indivial_i, :] = [ 3.  3. 20. 23.]
101      cord_individul_obj[indivial_i, :] = [ 4.  4. 34. 38.]
102      cord_individul_obj[indivial_i, :] = [ 5.  3. 38. 41.]
103      cord_individul_obj[indivial_i, :] = [ 6.  3. 80. 83.]
104      cord_individul_obj[indivial_i, :] = [ 7.  3. 42. 45.]
105      cord_individul_obj[indivial_i, :] = [ 8.  3. 46. 49.]
106      cord_individul_obj[indivial_i, :] = [ 9.  6. 66. 72.]
107
108      min(cord_individul_obj[:, 3]) =  13.0
109      historl_G_best_iter[iter, 3] =  13.0
110  Begin iteration:
111
112  iter =  5
113      cord_individul_obj[indivial_i, :] = [ 0.  5. 28. 33.]
114      cord_individul_obj[indivial_i, :] = [ 1.  6. 28. 34.]
115      cord_individul_obj[indivial_i, :] = [ 2.   5. 114. 119.]
116      cord_individul_obj[indivial_i, :] = [ 3.  5. 18. 23.]
117      cord_individul_obj[indivial_i, :] = [ 4.  3. 88. 91.]
118      cord_individul_obj[indivial_i, :] = [ 5.   5. 100. 105.]
119      cord_individul_obj[indivial_i, :] = [ 6.  5.  8. 13.]
120      cord_individul_obj[indivial_i, :] = [ 7.  4. 54. 58.]
121      cord_individul_obj[indivial_i, :] = [ 8.  5. 64. 69.]
122      cord_individul_obj[indivial_i, :] = [ 9.  6. 34. 40.]
123
124      min(cord_individul_obj[:, 3]) =  13.0
125      historl_G_best_iter[iter, 3] =  13.0
126  Begin iteration:
127
128  iter =  6
129      cord_individul_obj[indivial_i, :] = [ 0.  3. 60. 63.]
130      cord_individul_obj[indivial_i, :] = [ 1.  6. 80. 86.]
131      cord_individul_obj[indivial_i, :] = [ 2.  5.  8. 13.]
132      cord_individul_obj[indivial_i, :] = [ 3.  5. 20. 25.]
133      cord_individul_obj[indivial_i, :] = [ 4.  4. 34. 38.]
134      cord_individul_obj[indivial_i, :] = [ 5.  3. 58. 61.]
135      cord_individul_obj[indivial_i, :] = [ 6.  5. 84. 89.]
136      cord_individul_obj[indivial_i, :] = [ 7.  4. 62. 66.]
137      cord_individul_obj[indivial_i, :] = [ 8.  5.  8. 13.]
138      cord_individul_obj[indivial_i, :] = [ 9.  6. 34. 40.]
139
140      min(cord_individul_obj[:, 3]) =  13.0
141      historl_G_best_iter[iter, 3] =  13.0
142  Begin iteration:
143
144  iter =  7
145      cord_individul_obj[indivial_i, :] = [ 0.  3. 44. 47.]
146      cord_individul_obj[indivial_i, :] = [ 1.  5. 54. 59.]
147      cord_individul_obj[indivial_i, :] = [ 2.  5. 44. 49.]
148      cord_individul_obj[indivial_i, :] = [ 3.  5. 44. 49.]
149      cord_individul_obj[indivial_i, :] = [ 4.  5. 44. 49.]
150      cord_individul_obj[indivial_i, :] = [ 5.  5. 74. 79.]
151      cord_individul_obj[indivial_i, :] = [ 6.  5.  8. 13.]
152      cord_individul_obj[indivial_i, :] = [ 7.  5. 24. 29.]
153      cord_individul_obj[indivial_i, :] = [ 8.  5. 44. 49.]
154      cord_individul_obj[indivial_i, :] = [ 9.  5. 74. 79.]
155
156      min(cord_individul_obj[:, 3]) =  13.0
157      historl_G_best_iter[iter, 3] =  13.0
158  Begin iteration:
159
160  iter =  8
161      cord_individul_obj[indivial_i, :] = [ 0.  5.  8. 13.]
162      cord_individul_obj[indivial_i, :] = [ 1.  4. 48. 52.]
163      cord_individul_obj[indivial_i, :] = [ 2.  3. 88. 91.]
```

```
164        cord_individul_obj[indivial_i, :] = [ 3.  5. 20. 25.]
165        cord_individul_obj[indivial_i, :] = [ 4.  5. 12. 17.]
166        cord_individul_obj[indivial_i, :] = [ 5.  5.  8. 13.]
167        cord_individul_obj[indivial_i, :] = [ 6.  5. 114. 119.]
168        cord_individul_obj[indivial_i, :] = [ 7.  5.  8. 13.]
169        cord_individul_obj[indivial_i, :] = [ 8.  5. 12. 17.]
170        cord_individul_obj[indivial_i, :] = [ 9.  5. 40. 45.]
171
172    min(cord_individul_obj[:, 3]) =  13.0
173    historl_G_best_iter[iter, 3] =  13.0
174  Begin iteration:
175
176  iter =  9
177        cord_individul_obj[indivial_i, :] = [ 0.  5. 48. 53.]
178        cord_individul_obj[indivial_i, :] = [ 1.  4. 120. 124.]
179        cord_individul_obj[indivial_i, :] = [ 2.  5. 136. 141.]
180        cord_individul_obj[indivial_i, :] = [ 3.  5. 48. 53.]
181        cord_individul_obj[indivial_i, :] = [ 4.  5. 38. 43.]
182        cord_individul_obj[indivial_i, :] = [ 5.  3. 66. 69.]
183        cord_individul_obj[indivial_i, :] = [ 6.  5.  8. 13.]
184        cord_individul_obj[indivial_i, :] = [ 7.  5. 38. 43.]
185        cord_individul_obj[indivial_i, :] = [ 8.  5. 38. 43.]
186        cord_individul_obj[indivial_i, :] = [ 9.  5. 120. 125.]
187
188    min(cord_individul_obj[:, 3]) =  13.0
189    historl_G_best_iter[iter, 3] =  13.0
190  Begin iteration:
191
192  iter =  10
193        cord_individul_obj[indivial_i, :] = [ 0.  3. 44. 47.]
194        cord_individul_obj[indivial_i, :] = [ 1.  6. 44. 50.]
195        cord_individul_obj[indivial_i, :] = [ 2.  5.  8. 13.]
196        cord_individul_obj[indivial_i, :] = [ 3.  5. 44. 49.]
197        cord_individul_obj[indivial_i, :] = [ 4.  5. 12. 17.]
198        cord_individul_obj[indivial_i, :] = [ 5.  5. 44. 49.]
199        cord_individul_obj[indivial_i, :] = [ 6.  5. 48. 53.]
200        cord_individul_obj[indivial_i, :] = [ 7.  5. 28. 33.]
201        cord_individul_obj[indivial_i, :] = [ 8.  5. 24. 29.]
202        cord_individul_obj[indivial_i, :] = [ 9.  5. 76. 81.]
203
204    min(cord_individul_obj[:, 3]) =  13.0
205    historl_G_best_iter[iter, 3] =  13.0
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: [13.5 26.  3.  8.5 17.5 21. ]
217        time:  [0. 0. 0. 0. 0. 0.]
218        num_QC:  [4. 2. 4. 3. 3. 2.]
219    Objective function values and some other indicators:
220    Obj0 = 5.00          Obj1 = 8.00          Obj0 + Obj1 = 13.00
221    Total movement of crane: 8.00
222    Total waiting time in berth position: 0.00
223    Total index of q during berthing: 607.00
224    Specific arrangement for each vessel:
```

225 V_id: 0 | li: 5.0 | xi: 13.5 | bow of i: 11.0 | tail of i: 16.0 | 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

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: 3.0 | bow of i: 0.0 | tail of i: 6.0 | 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

228 V_id: 3 | li: 5.0 | xi: 8.5 | bow of i: 6.0 | tail of i: 11.0 | 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: 17.5 | bow of i: 16.0 | tail of i: 19.0 | 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

230 V_id: 5 | li: 4.0 | xi: 21.0 | bow of i: 19.0 | tail of i: 23.0 | 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

```
231
232  Algorithm finished and the total CPU time: 38 s
233  End
234
```