```
  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=42969
  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 =  26
 23        maxIter_num =  10
 24        W_inertia =  1.5
 25        oder_type_num =  10
 26        c1 =  2.0
 27        c2 =  2.5
 28        r1 =  0.9363847008493216
 29        r2 =  0.9363847008493216
 30  Begin iteration:
 31
 32  iter =  0
 33        cord_individul_obj[indivial_i, :] = [ 0.  5. 44. 49.]
 34        cord_individul_obj[indivial_i, :] = [ 1.  6. 136. 142.]
 35        cord_individul_obj[indivial_i, :] = [ 2.  6. 148. 154.]
 36        cord_individul_obj[indivial_i, :] = [ 3.  5. 68. 73.]
 37        cord_individul_obj[indivial_i, :] = [ 4.  4. 18. 22.]
 38        cord_individul_obj[indivial_i, :] = [ 5.  5. 104. 109.]
 39        cord_individul_obj[indivial_i, :] = [ 6.  6. 18. 24.]
 40        cord_individul_obj[indivial_i, :] = [ 7.  5. 28. 33.]
 41        cord_individul_obj[indivial_i, :] = [ 8.  4. 164. 168.]
 42        cord_individul_obj[indivial_i, :] = [ 9.  4. 122. 126.]
 43
 44      min(cord_individul_obj[:, 3]) = 22.0
 45      historl_G_best_iter[iter, 3] = 22.0
 46  Begin iteration:
 47
 48  iter =  1
 49        cord_individul_obj[indivial_i, :] = [ 0.  3. 84. 87.]
 50        cord_individul_obj[indivial_i, :] = [ 1.  5. 44. 49.]
 51        cord_individul_obj[indivial_i, :] = [ 2.  4. 72. 76.]
 52        cord_individul_obj[indivial_i, :] = [ 3.  5. 64. 69.]
 53        cord_individul_obj[indivial_i, :] = [ 4.  4. 24. 28.]
 54        cord_individul_obj[indivial_i, :] = [ 5.  4. 60. 64.]
 55        cord_individul_obj[indivial_i, :] = [ 6.  3. 74. 77.]
 56        cord_individul_obj[indivial_i, :] = [ 7.  4. 12. 16.]
 57        cord_individul_obj[indivial_i, :] = [ 8.  4. 18. 22.]
 58        cord_individul_obj[indivial_i, :] = [ 9.  4. 48. 52.]
 59
 60      min(cord_individul_obj[:, 3]) = 16.0
 61      historl_G_best_iter[iter, 3] = 16.0
 62  Begin iteration:
 63
 64  iter =  2
 65        cord_individul_obj[indivial_i, :] = [ 0.  4. 12. 16.]
 66        cord_individul_obj[indivial_i, :] = [ 1.  3. 50. 53.]
 67        cord_individul_obj[indivial_i, :] = [ 2.  4. 86. 90.]
 68        cord_individul_obj[indivial_i, :] = [ 3.  4. 134. 138.]
 69        cord_individul_obj[indivial_i, :] = [ 4.  3. 34. 37.]
 70        cord_individul_obj[indivial_i, :] = [ 5.  4. 48. 52.]
 71        cord_individul_obj[indivial_i, :] = [ 6.  5. 120. 125.]
 72        cord_individul_obj[indivial_i, :] = [ 7.  3. 86. 89.]
 73        cord_individul_obj[indivial_i, :] = [ 8.  5. 90. 95.]
 74        cord_individul_obj[indivial_i, :] = [ 9.  4. 46. 50.]
 75
 76      min(cord_individul_obj[:, 3]) = 16.0
 77      historl_G_best_iter[iter, 3] = 16.0
 78  Begin iteration:
 79
```

```
80   iter = 3
81       cord_individul_obj[indivial_i, :] = [ 0.  3. 34. 37.]
82       cord_individul_obj[indivial_i, :] = [ 1.  6.  8. 14.]
83       cord_individul_obj[indivial_i, :] = [ 2.  4. 120. 124.]
84       cord_individul_obj[indivial_i, :] = [ 3.  4. 12. 16.]
85       cord_individul_obj[indivial_i, :] = [ 4.  5. 16. 21.]
86       cord_individul_obj[indivial_i, :] = [ 5.  4. 76. 80.]
87       cord_individul_obj[indivial_i, :] = [ 6.  5. 42. 47.]
88       cord_individul_obj[indivial_i, :] = [ 7.  3. 176. 179.]
89       cord_individul_obj[indivial_i, :] = [ 8.  4. 38. 42.]
90       cord_individul_obj[indivial_i, :] = [ 9.  4. 80. 84.]
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.  6. 12. 18.]
98       cord_individul_obj[indivial_i, :] = [ 1.  6. 12. 18.]
99       cord_individul_obj[indivial_i, :] = [ 2.  6. 12. 18.]
100      cord_individul_obj[indivial_i, :] = [ 3.  5.  96. 101.]
101      cord_individul_obj[indivial_i, :] = [ 4.  4. 84. 88.]
102      cord_individul_obj[indivial_i, :] = [ 5.  4. 56. 60.]
103      cord_individul_obj[indivial_i, :] = [ 6.  4. 30. 34.]
104      cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
105      cord_individul_obj[indivial_i, :] = [ 8.  5. 20. 25.]
106      cord_individul_obj[indivial_i, :] = [ 9.  4. 64. 68.]
107
108     min(cord_individul_obj[:, 3]) = 14.0
109     historl_G_best_iter[iter, 3] = 14.0
110  Begin iteration:
111
112  iter = 5
113      cord_individul_obj[indivial_i, :] = [ 0.  6.  8. 14.]
114      cord_individul_obj[indivial_i, :] = [ 1.  6.  8. 14.]
115      cord_individul_obj[indivial_i, :] = [ 2.  4. 82. 86.]
116      cord_individul_obj[indivial_i, :] = [ 3.  6.  8. 14.]
117      cord_individul_obj[indivial_i, :] = [ 4.  4. 18. 22.]
118      cord_individul_obj[indivial_i, :] = [ 5.  4. 12. 16.]
119      cord_individul_obj[indivial_i, :] = [ 6.  4. 58. 62.]
120      cord_individul_obj[indivial_i, :] = [ 7.  4. 30. 34.]
121      cord_individul_obj[indivial_i, :] = [ 8.  4. 12. 16.]
122      cord_individul_obj[indivial_i, :] = [ 9.  4. 44. 48.]
123
124     min(cord_individul_obj[:, 3]) = 14.0
125     historl_G_best_iter[iter, 3] = 14.0
126  Begin iteration:
127
128  iter = 6
129      cord_individul_obj[indivial_i, :] = [ 0.  5. 30. 35.]
130      cord_individul_obj[indivial_i, :] = [ 1.  6. 16. 22.]
131      cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
132      cord_individul_obj[indivial_i, :] = [ 3.  4. 32. 36.]
133      cord_individul_obj[indivial_i, :] = [ 4.  6. 20. 26.]
134      cord_individul_obj[indivial_i, :] = [ 5.  5. 46. 51.]
135      cord_individul_obj[indivial_i, :] = [ 6.  4. 44. 48.]
136      cord_individul_obj[indivial_i, :] = [ 7.  6.  8. 14.]
137      cord_individul_obj[indivial_i, :] = [ 8.  5. 90. 95.]
138      cord_individul_obj[indivial_i, :] = [ 9.  6. 12. 18.]
139
140     min(cord_individul_obj[:, 3]) = 14.0
141     historl_G_best_iter[iter, 3] = 14.0
142  Begin iteration:
143
144  iter = 7
145      cord_individul_obj[indivial_i, :] = [ 0.  4. 24. 28.]
146      cord_individul_obj[indivial_i, :] = [ 1.  6. 28. 34.]
147      cord_individul_obj[indivial_i, :] = [ 2.  4. 44. 48.]
148      cord_individul_obj[indivial_i, :] = [ 3.  3. 68. 71.]
149      cord_individul_obj[indivial_i, :] = [ 4.  6.  8. 14.]
150      cord_individul_obj[indivial_i, :] = [ 5.  5. 64. 69.]
151      cord_individul_obj[indivial_i, :] = [ 6.  4. 50. 54.]
152      cord_individul_obj[indivial_i, :] = [ 7.  4. 38. 42.]
153      cord_individul_obj[indivial_i, :] = [ 8.  6.  8. 14.]
154      cord_individul_obj[indivial_i, :] = [ 9.  3. 106. 109.]
155
156     min(cord_individul_obj[:, 3]) = 14.0
157     historl_G_best_iter[iter, 3] = 14.0
158  Begin iteration:
159
160  iter = 8
161      cord_individul_obj[indivial_i, :] = [ 0.  3. 110. 113.]
162      cord_individul_obj[indivial_i, :] = [ 1.  6. 44. 50.]
163      cord_individul_obj[indivial_i, :] = [ 2.  3. 148. 151.]
```

```
164        cord_individul_obj[indivial_i, :] = [ 3.  4. 104. 108.]
165        cord_individul_obj[indivial_i, :] = [ 4.  6. 24. 30.]
166        cord_individul_obj[indivial_i, :] = [ 5.  5. 44. 49.]
167        cord_individul_obj[indivial_i, :] = [ 6.  3. 64. 67.]
168        cord_individul_obj[indivial_i, :] = [ 7.  6. 44. 50.]
169        cord_individul_obj[indivial_i, :] = [ 8.  4. 112. 116.]
170        cord_individul_obj[indivial_i, :] = [ 9.  6.  8. 14.]
171
172     min(cord_individul_obj[:, 3]) =  14.0
173     historl_G_best_iter[iter, 3] =  14.0
174  Begin iteration:
175
176  iter =  9
177        cord_individul_obj[indivial_i, :] = [ 0.  5. 16. 21.]
178        cord_individul_obj[indivial_i, :] = [ 1.  6.  8. 14.]
179        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
180        cord_individul_obj[indivial_i, :] = [ 3.  5.  8. 13.]
181        cord_individul_obj[indivial_i, :] = [ 4.  6.  8. 14.]
182        cord_individul_obj[indivial_i, :] = [ 5.  6.  8. 14.]
183        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
184        cord_individul_obj[indivial_i, :] = [ 7.  4. 34. 38.]
185        cord_individul_obj[indivial_i, :] = [ 8.  4. 128. 132.]
186        cord_individul_obj[indivial_i, :] = [ 9.  4. 68. 72.]
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.  6. 24. 30.]
194        cord_individul_obj[indivial_i, :] = [ 1.  4. 42. 46.]
195        cord_individul_obj[indivial_i, :] = [ 2.  4. 52. 56.]
196        cord_individul_obj[indivial_i, :] = [ 3.  6. 24. 30.]
197        cord_individul_obj[indivial_i, :] = [ 4.  4. 32. 36.]
198        cord_individul_obj[indivial_i, :] = [ 5.  5. 60. 65.]
199        cord_individul_obj[indivial_i, :] = [ 6.  6. 44. 50.]
200        cord_individul_obj[indivial_i, :] = [ 7.  4. 102. 106.]
201        cord_individul_obj[indivial_i, :] = [ 8.  5.  8. 13.]
202        cord_individul_obj[indivial_i, :] = [ 9.  6. 44. 50.]
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 =  105.0
214     Proportion_of_area =  0.09722222222222222
215        BEST_CHROM =
216         berth:  [ 2.5 26.  16.   7.5 11.5 21. ]
217         time:  [0. 0. 0. 0. 0. 0.]
218         num_QC:  [2. 2. 3. 2. 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: 657.00
224     Specific arrangement for each vessel:
```

225 | V_id: 0 | 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

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: 16.0 | bow of i: 13.0 | tail of i: 19.0 | 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: 7.5 | bow of i: 5.0 | tail of i: 10.0 | 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: 11.5 | bow of i: 10.0 | tail of i: 13.0 | 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: 43 s
233  End
234
```