


```

80 iter = 3
81   cord_individul_obj[indivial_i, :] = [ 0.  3. 40. 43.]
82   cord_individul_obj[indivial_i, :] = [ 1.  4. 20. 24.]
83   cord_individul_obj[indivial_i, :] = [ 2.  4. 66. 70.]
84   cord_individul_obj[indivial_i, :] = [ 3.  3. 40. 43.]
85   cord_individul_obj[indivial_i, :] = [ 4.  4. 30. 34.]
86   cord_individul_obj[indivial_i, :] = [ 5.  4. 30. 34.]
87   cord_individul_obj[indivial_i, :] = [ 6.  5. 34. 39.]
88   cord_individul_obj[indivial_i, :] = [ 7.  5. 34. 39.]
89   cord_individul_obj[indivial_i, :] = [ 8.  3. 26. 29.]
90   cord_individul_obj[indivial_i, :] = [ 9.  4. 30. 34.]
91
92   min(cord_individul_obj[:, 3]) = 24.0
93   historl_G_best_iter[iter, 3] = 24.0
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. 114. 118.]
99     cord_individul_obj[indivial_i, :] = [ 2.  4. 20. 24.]
100    cord_individul_obj[indivial_i, :] = [ 3.  3.  8. 11.]
101    cord_individul_obj[indivial_i, :] = [ 4.  4. 42. 46.]
102    cord_individul_obj[indivial_i, :] = [ 5.  6. 30. 36.]
103    cord_individul_obj[indivial_i, :] = [ 6.  4. 30. 34.]
104    cord_individul_obj[indivial_i, :] = [ 7.  5. 26. 31.]
105    cord_individul_obj[indivial_i, :] = [ 8.  4. 46. 50.]
106    cord_individul_obj[indivial_i, :] = [ 9.  6.  8. 14.]
107
108    min(cord_individul_obj[:, 3]) = 11.0
109    historl_G_best_iter[iter, 3] = 11.0
110    Begin iteration:
111
112    iter = 5
113      cord_individul_obj[indivial_i, :] = [ 0.  3. 20. 23.]
114      cord_individul_obj[indivial_i, :] = [ 1.  3.  8. 11.]
115      cord_individul_obj[indivial_i, :] = [ 2.  5. 12. 17.]
116      cord_individul_obj[indivial_i, :] = [ 3.  5. 20. 25.]
117      cord_individul_obj[indivial_i, :] = [ 4.  4. 12. 16.]
118      cord_individul_obj[indivial_i, :] = [ 5.  4. 12. 16.]
119      cord_individul_obj[indivial_i, :] = [ 6.  5. 12. 17.]
120      cord_individul_obj[indivial_i, :] = [ 7.  5. 54. 59.]
121      cord_individul_obj[indivial_i, :] = [ 8.  3. 20. 23.]
122      cord_individul_obj[indivial_i, :] = [ 9.  5. 12. 17.]
123
124      min(cord_individul_obj[:, 3]) = 11.0
125      historl_G_best_iter[iter, 3] = 11.0
126      Begin iteration:
127
128      iter = 6
129        cord_individul_obj[indivial_i, :] = [ 0.  3. 38. 41.]
130        cord_individul_obj[indivial_i, :] = [ 1.  4. 20. 24.]
131        cord_individul_obj[indivial_i, :] = [ 2.  6.  8. 14.]
132        cord_individul_obj[indivial_i, :] = [ 3.  3. 32. 35.]
133        cord_individul_obj[indivial_i, :] = [ 4.  6. 14. 20.]
134        cord_individul_obj[indivial_i, :] = [ 5.  6. 12. 18.]
135        cord_individul_obj[indivial_i, :] = [ 6.  6.  8. 14.]
136        cord_individul_obj[indivial_i, :] = [ 7.  3.  8. 11.]
137        cord_individul_obj[indivial_i, :] = [ 8.  3. 60. 63.]
138        cord_individul_obj[indivial_i, :] = [ 9.  6. 18. 24.]
139
140        min(cord_individul_obj[:, 3]) = 11.0
141        historl_G_best_iter[iter, 3] = 11.0
142        Begin iteration:
143
144        iter = 7
145          cord_individul_obj[indivial_i, :] = [ 0.  3. 20. 23.]
146          cord_individul_obj[indivial_i, :] = [ 1.  4. 40. 44.]
147          cord_individul_obj[indivial_i, :] = [ 2.  5. 38. 43.]
148          cord_individul_obj[indivial_i, :] = [ 3.  5. 12. 17.]
149          cord_individul_obj[indivial_i, :] = [ 4.  3. 28. 31.]
150          cord_individul_obj[indivial_i, :] = [ 5.  4. 12. 16.]
151          cord_individul_obj[indivial_i, :] = [ 6.  3. 20. 23.]
152          cord_individul_obj[indivial_i, :] = [ 7.  5. 26. 31.]
153          cord_individul_obj[indivial_i, :] = [ 8.  3.  8. 11.]
154          cord_individul_obj[indivial_i, :] = [ 9.  5. 20. 25.]
155
156          min(cord_individul_obj[:, 3]) = 11.0
157          historl_G_best_iter[iter, 3] = 11.0
158          Begin iteration:
159
160          iter = 8
161            cord_individul_obj[indivial_i, :] = [ 0.  3. 36. 39.]
162            cord_individul_obj[indivial_i, :] = [ 1.  3.  8. 11.]
163            cord_individul_obj[indivial_i, :] = [ 2.  5. 48. 53.]

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```

164   cord_individul_obj[indivial_i,:] = [ 3. 5. 20. 25.]
165   cord_individul_obj[indivial_i,:] = [ 4. 4. 12. 16.]
166   cord_individul_obj[indivial_i,:] = [ 5. 4. 24. 28.]
167   cord_individul_obj[indivial_i,:] = [ 6. 5. 12. 17.]
168   cord_individul_obj[indivial_i,:] = [ 7. 3. 52. 55.]
169   cord_individul_obj[indivial_i,:] = [ 8. 3. 20. 23.]
170   cord_individul_obj[indivial_i,:] = [ 9. 5. 18. 23.]
171
172   min(cord_individul_obj[:,3]) = 11.0
173   historl_G_best_iter[iter,3] = 11.0
174   Begin iteration:
175
176   iter = 9
177   cord_individul_obj[indivial_i,:] = [ 0. 3. 12. 15.]
178   cord_individul_obj[indivial_i,:] = [ 1. 4. 40. 44.]
179   cord_individul_obj[indivial_i,:] = [ 2. 4. 18. 22.]
180   cord_individul_obj[indivial_i,:] = [ 3. 3. 20. 23.]
181   cord_individul_obj[indivial_i,:] = [ 4. 3. 20. 23.]
182   cord_individul_obj[indivial_i,:] = [ 5. 3. 20. 23.]
183   cord_individul_obj[indivial_i,:] = [ 6. 3. 12. 15.]
184   cord_individul_obj[indivial_i,:] = [ 7. 3. 8. 11.]
185   cord_individul_obj[indivial_i,:] = [ 8. 3. 12. 15.]
186   cord_individul_obj[indivial_i,:] = [ 9. 3. 20. 23.]
187
188   min(cord_individul_obj[:,3]) = 11.0
189   historl_G_best_iter[iter,3] = 11.0
190   Begin iteration:
191
192   iter = 10
193   cord_individul_obj[indivial_i,:] = [ 0. 3. 38. 41.]
194   cord_individul_obj[indivial_i,:] = [ 1. 3. 8. 11.]
195   cord_individul_obj[indivial_i,:] = [ 2. 5. 36. 41.]
196   cord_individul_obj[indivial_i,:] = [ 3. 5. 12. 17.]
197   cord_individul_obj[indivial_i,:] = [ 4. 4. 18. 22.]
198   cord_individul_obj[indivial_i,:] = [ 5. 4. 12. 16.]
199   cord_individul_obj[indivial_i,:] = [ 6. 5. 12. 17.]
200   cord_individul_obj[indivial_i,:] = [ 7. 5. 52. 57.]
201   cord_individul_obj[indivial_i,:] = [ 8. 3. 12. 15.]
202   cord_individul_obj[indivial_i,:] = [ 9. 5. 12. 17.]
203
204   min(cord_individul_obj[:,3]) = 11.0
205   historl_G_best_iter[iter,3] = 11.0
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: [ 7.5 26. 20. 2.5 11.5 15. ]
217   time: [0. 0. 0. 0. 0. 0.]
218   num_QC: [2. 2. 4. 2. 3. 3.]
219   Objective function values and some other indicators:
220   Obj0 = 3.00      Obj1 = 8.00      Obj0 + Obj1 = 11.00
221   Total movement of crane: 8.00
222   Total waiting time in berth position: 0.00
223   Total index of q during berthing: 654.00
224   Specific arrangement for each vessel:
225   V_id: 0      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
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
      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: 20.0      bow of i: 17.0      tail of i: 23.0      gama_i0: 0.0      gama_i1: 3
      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: 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
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
      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: 15.0      bow of i: 13.0      tail of i: 17.0      gama_i0: 0.0      gama_i1: 3
      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: 41 s
233   End
234

```