


```

80     second level: [0. 2. 3.]
81     third level: [5. 4. 2.]]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 10.66   temp_best_value_gen = 10.20
86     Yes, update solution and obj[gen] = 10.20
87     solution chromosome =
88     first level: [ [ 8. 3. 13.]
89     second level: [0. 3. 4.]
90     third level: [4. 4. 4.]]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 10.20   temp_best_value_gen = 6.10
95     Yes, update solution and obj[gen] = 6.10
96     solution chromosome =
97     first level: [ [13. 3. 8.]
98     second level: [0. 2. 2.]
99     third level: [5. 4. 4.]]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 6.10   temp_best_value_gen = 5.90
104    Yes, update solution and obj[gen] = 5.90
105    solution chromosome =
106    first level: [ [13. 3. 8.]
107    second level: [0. 0. 2.]
108    third level: [5. 4. 4.]]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 5.90   temp_best_value_gen = 5.90
113    No, maintain solution and obj[gen] = 5.90 , and the tolerance_counter = 1
114    solution chromosome =
115    first level: [ [13. 3. 8.]
116    second level: [0. 0. 2.]
117    third level: [5. 4. 4.]]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 5.90   temp_best_value_gen = 5.90
122    No, maintain solution and obj[gen] = 5.90 , and the tolerance_counter = 2
123    solution chromosome =
124    first level: [ [13. 3. 8.]
125    second level: [0. 0. 2.]
126    third level: [5. 4. 4.]]
127    The No. 10 iteration is finished!
128
129    Beging the No. 11 iteration:
130    obj[gen-1] = 5.90   temp_best_value_gen = 5.90
131    No, maintain solution and obj[gen] = 5.90 , and the tolerance_counter = 3
132    solution chromosome =
133    first level: [ [13. 3. 8.]
134    second level: [0. 0. 2.]
135    third level: [5. 4. 4.]]
136    The No. 11 iteration is finished!
137
138    Beging the No. 12 iteration:
139    obj[gen-1] = 5.90   temp_best_value_gen = 4.00
140    Yes, update solution and obj[gen] = 4.00
141    solution chromosome =
142    first level: [ [ 3. 8. 13.]
143    second level: [0. 2. 0.]
144    third level: [4. 4. 5.]]
145    The No. 12 iteration is finished!
146
147    Beging the No. 13 iteration:
148    obj[gen-1] = 4.00   temp_best_value_gen = 4.00
149    No, maintain solution and obj[gen] = 4.00 , and the tolerance_counter = 1
150    solution chromosome =
151    first level: [ [ 3. 8. 13.]
152    second level: [0. 2. 0.]
153    third level: [4. 4. 5.]]
154    The No. 13 iteration is finished!
155
156    Beging the No. 14 iteration:
157    obj[gen-1] = 4.00   temp_best_value_gen = 4.00
158    No, maintain solution and obj[gen] = 4.00 , and the tolerance_counter = 2
159    solution chromosome =
160    first level: [ [ 3. 8. 13.]
161    second level: [0. 2. 0.]
162    third level: [4. 4. 5.]]
163    The No. 14 iteration is finished!

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164
165 Beging the No. 15 iteration:
166   obj[gen-1] = 4.00   temp_best_value_gen = 4.00
167   No, maintain solution and obj[gen] = 4.00 , and the tolerance_counter = 3
168   solution chromosome =
169     first level: [ [ 3. 8. 13.]
170     second level: [0. 2. 0.]
171     third level: [4. 4. 5.] ]
172   The No. 15 iteration is finished!
173
174 Beging the No. 16 iteration:
175   obj[gen-1] = 4.00   temp_best_value_gen = 1.90
176   Yes, update solution and obj[gen] = 1.90
177   solution chromosome =
178     first level: [ [ 3. 8. 13.]
179     second level: [0. 0. 0.]
180     third level: [4. 4. 5.] ]
181   The No. 16 iteration is finished!
182
183 Beging the No. 17 iteration:
184   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
185   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 1
186   solution chromosome =
187     first level: [ [ 3. 8. 13.]
188     second level: [0. 0. 0.]
189     third level: [4. 4. 5.] ]
190   The No. 17 iteration is finished!
191
192 Beging the No. 18 iteration:
193   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
194   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 2
195   solution chromosome =
196     first level: [ [ 3. 8. 13.]
197     second level: [0. 0. 0.]
198     third level: [4. 4. 5.] ]
199   The No. 18 iteration is finished!
200
201 Beging the No. 19 iteration:
202   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
203   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 3
204   solution chromosome =
205     first level: [ [ 3. 8. 13.]
206     second level: [0. 0. 0.]
207     third level: [4. 4. 5.] ]
208   The No. 19 iteration is finished!
209
210 Beging the No. 20 iteration:
211   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
212   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 4
213   solution chromosome =
214     first level: [ [ 3. 8. 13.]
215     second level: [0. 0. 0.]
216     third level: [4. 4. 5.] ]
217   The No. 20 iteration is finished!
218
219 Beging the No. 21 iteration:
220   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
221   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 5
222   solution chromosome =
223     first level: [ [ 3. 8. 13.]
224     second level: [0. 0. 0.]
225     third level: [4. 4. 5.] ]
226   The No. 21 iteration is finished!
227
228 Beging the No. 22 iteration:
229   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
230   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 6
231   solution chromosome =
232     first level: [ [ 3. 8. 13.]
233     second level: [0. 0. 0.]
234     third level: [4. 4. 5.] ]
235   The No. 22 iteration is finished!
236
237 Beging the No. 23 iteration:
238   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
239   No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 7
240   solution chromosome =
241     first level: [ [ 3. 8. 13.]
242     second level: [0. 0. 0.]
243     third level: [4. 4. 5.] ]
244   The No. 23 iteration is finished!
245
246 Beging the No. 24 iteration:
247   obj[gen-1] = 1.90   temp_best_value_gen = 1.90
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248 No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 8
249 solution chromosome =
250     first level: [ [ 3. 8. 13.]
251     second level: [0. 0. 0.]
252     third level: [4. 4. 5.] ]
253 The No. 24 iteration is finished!
254
255 Beging the No. 25 iteration:
256 obj[gen-1] = 1.90 temp_best_value_gen = 1.90
257 No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 9
258 solution chromosome =
259     first level: [ [ 3. 8. 13.]
260     second level: [0. 0. 0.]
261     third level: [4. 4. 5.] ]
262 The No. 25 iteration is finished!
263
264 Beging the No. 26 iteration:
265 obj[gen-1] = 1.90 temp_best_value_gen = 1.90
266 No, maintain solution and obj[gen] = 1.90 , and the tolerance_counter = 10
267 solution chromosome =
268     first level: [ [ 3. 8. 13.]
269     second level: [0. 0. 0.]
270     third level: [4. 4. 5.] ]
271 The No. 26 iteration is finished!
272
273
274 -----
275 The iteration is terminated and then visulize the solution:
276 solution chromosome =
277     first level: [ [ 3. 8. 13.]
278     second level: [0. 0. 0.]
279     third level: [4. 4. 5.] ]
280 Objective function values and some other indicators:
281 Obj0 = 1.00      Obj1 = 0.00      Obj0 + Obj1 = 1.00
282 Total movement of crane: 0.00
283 Total waiting time in berth position: 0.00
284 Total index of q during berthing: 99.00
285 Specific arrangement for each vessel:
286 V_id: 0          li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 0.0          gama_i1: 2.0
287                duration_time_i: 2.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
288                li: 4.0          xi: 8.0          bow of i: 6.0          tail of i: 10.0          gama_i0: 0.0          gama_i1: 1.0
289                duration_time_i: 1.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
290 V_id: 2          li: 6.0          xi: 13.0          bow of i: 10.0          tail of i: 16.0          gama_i0: 0.0          gama_i1: 1
291                duration_time_i: 1.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
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