


```

80     second level: [3. 1.]
81     third level: [2. 4.] ]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 11.00   temp_best_value_gen = 11.00
86     No, maintain solution and obj[gen] = 11.00 , and the tolerance_counter = 3
87     solution chromosome =
88     first level: [ [2. 8.]
89     second level: [3. 1.]
90     third level: [2. 4.] ]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 11.00   temp_best_value_gen = 9.50
95     Yes, update solution and obj[gen] = 9.50
96     solution chromosome =
97     first level: [ [8. 4.]
98     second level: [1. 3.]
99     third level: [4. 2.] ]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 9.50   temp_best_value_gen = 3.50
104    Yes, update solution and obj[gen] = 3.50
105    solution chromosome =
106    first level: [ [2. 8.]
107    second level: [1. 0.]
108    third level: [4. 8.] ]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 3.50   temp_best_value_gen = 3.50
113    No, maintain solution and obj[gen] = 3.50 , and the tolerance_counter = 1
114    solution chromosome =
115    first level: [ [2. 8.]
116    second level: [1. 0.]
117    third level: [4. 8.] ]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 3.50   temp_best_value_gen = 3.50
122    No, maintain solution and obj[gen] = 3.50 , and the tolerance_counter = 2
123    solution chromosome =
124    first level: [ [2. 8.]
125    second level: [1. 0.]
126    third level: [4. 8.] ]
127    The No. 10 iteration is finished!
128
129    Beging the No. 11 iteration:
130    obj[gen-1] = 3.50   temp_best_value_gen = 3.50
131    No, maintain solution and obj[gen] = 3.50 , and the tolerance_counter = 3
132    solution chromosome =
133    first level: [ [2. 8.]
134    second level: [1. 0.]
135    third level: [4. 8.] ]
136    The No. 11 iteration is finished!
137
138    Beging the No. 12 iteration:
139    obj[gen-1] = 3.50   temp_best_value_gen = 3.50
140    No, maintain solution and obj[gen] = 3.50 , and the tolerance_counter = 4
141    solution chromosome =
142    first level: [ [2. 8.]
143    second level: [1. 0.]
144    third level: [4. 8.] ]
145    The No. 12 iteration is finished!
146
147    Beging the No. 13 iteration:
148    obj[gen-1] = 3.50   temp_best_value_gen = 3.50
149    No, maintain solution and obj[gen] = 3.50 , and the tolerance_counter = 5
150    solution chromosome =
151    first level: [ [2. 8.]
152    second level: [1. 0.]
153    third level: [4. 8.] ]
154    The No. 13 iteration is finished!
155
156    Beging the No. 14 iteration:
157    obj[gen-1] = 3.50   temp_best_value_gen = 1.50
158    Yes, update solution and obj[gen] = 1.50
159    solution chromosome =
160    first level: [ [2. 8.]
161    second level: [0. 0.]
162    third level: [4. 8.] ]
163    The No. 14 iteration is finished!

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164
165 Beging the No. 15 iteration:
166 obj[gen-1] = 1.50 temp_best_value_gen = 1.50
167 No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 1
168 solution chromosome =
169 first level: [ [2. 8.]
170 second level: [0. 0.]
171 third level: [4. 8.] ]
172 The No. 15 iteration is finished!
173
174 Beging the No. 16 iteration:
175 obj[gen-1] = 1.50 temp_best_value_gen = 1.50
176 No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 2
177 solution chromosome =
178 first level: [ [2. 8.]
179 second level: [0. 0.]
180 third level: [4. 8.] ]
181 The No. 16 iteration is finished!
182
183 Beging the No. 17 iteration:
184 obj[gen-1] = 1.50 temp_best_value_gen = 1.50
185 No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 3
186 solution chromosome =
187 first level: [ [2. 8.]
188 second level: [0. 0.]
189 third level: [4. 8.] ]
190 The No. 17 iteration is finished!
191
192 Beging the No. 18 iteration:
193 obj[gen-1] = 1.50 temp_best_value_gen = 1.50
194 No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 4
195 solution chromosome =
196 first level: [ [2. 8.]
197 second level: [0. 0.]
198 third level: [4. 8.] ]
199 The No. 18 iteration is finished!
200
201 Beging the No. 19 iteration:
202 obj[gen-1] = 1.50 temp_best_value_gen = 1.50
203 No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 5
204 solution chromosome =
205 first level: [ [2. 8.]
206 second level: [0. 0.]
207 third level: [4. 8.] ]
208 The No. 19 iteration is finished!
209
210 Beging the No. 20 iteration:
211 obj[gen-1] = 1.50 temp_best_value_gen = 1.50
212 No, maintain solution and obj[gen] = 1.50 , and the tolerance_counter = 6
213 solution chromosome =
214 first level: [ [2. 8.]
215 second level: [0. 0.]
216 third level: [4. 8.] ]
217 The No. 20 iteration is finished!
218
219
220 -----
221 The iteration is terminated and then visulize the solution:
222 solution chromosome =
223 first level: [ [2. 8.]
224 second level: [0. 0.]
225 third level: [4. 8.] ]
226 Objective function values and some other indicators:
227 Obj0 = 1.00 Obj1 = 0.00 Obj0 + Obj1 = 1.00
228 Total movement of crane: 0.00
229 Total waiting time in berth position: 0.00
230 Total index of q during berthing: 51.00
231 Specific arrangement for each vessel:
232 V_id: 0 li: 4.0 xi: 2.0 bow of i: 0.0 tail of i: 4.0 gama_i0: 0.0 gama_i1: 2.0
duration_time_i: 2.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
233 V_id: 1 li: 8.0 xi: 8.0 bow of i: 4.0 tail of i: 12.0 gama_i0: 0.0 gama_i1: 1.0
duration_time_i: 1.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
234
235 Algorithm finished and the total CPU time: 192 s
236 End
237

```