


```

80     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
81     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 35.90 temp_best_value_gen = 35.90
86     No, maintain solution and obj[gen] = 35.90 , and the tolerance_counter = 3
87     solution chromosome =
88     first level: [ [ 4. 9.5 2. 17. 24.5 27.5 12.5 2.5 3. 2. 3. ]
89     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
90     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 35.90 temp_best_value_gen = 35.90
95     No, maintain solution and obj[gen] = 35.90 , and the tolerance_counter = 4
96     solution chromosome =
97     first level: [ [ 4. 9.5 2. 17. 24.5 27.5 12.5 2.5 3. 2. 3. ]
98     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
99     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 35.90 temp_best_value_gen = 35.90
104     No, maintain solution and obj[gen] = 35.90 , and the tolerance_counter = 5
105     solution chromosome =
106     first level: [ [ 4. 9.5 2. 17. 24.5 27.5 12.5 2.5 3. 2. 3. ]
107     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
108     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 35.90 temp_best_value_gen = 35.90
113     No, maintain solution and obj[gen] = 35.90 , and the tolerance_counter = 6
114     solution chromosome =
115     first level: [ [ 4. 9.5 2. 17. 24.5 27.5 12.5 2.5 3. 2. 3. ]
116     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
117     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
118    The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 35.90 temp_best_value_gen = 35.90
122     No, maintain solution and obj[gen] = 35.90 , and the tolerance_counter = 7
123     solution chromosome =
124     first level: [ [ 4. 9.5 2. 17. 24.5 27.5 12.5 2.5 3. 2. 3. ]
125     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
126     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
127    The No. 10 iteration is finished!
128
129 -----
130
131 The iteration is terminated and then visulize the solution:
132     solution chromosome =
133     first level: [ [ 4. 9.5 2. 17. 24.5 27.5 12.5 2.5 3. 2. 3. ]
134     second level: [ 0. 7. 4. 2. 11. 4. 4. 1. 7. 9. 12.]
135     third level: [8. 2. 2. 3. 4. 2. 2. 2. 2. 6.] ]
136     Objective function values and some other indicators:
137     Obj0 = 13.00 Obj1 = 112.00 Obj0 + Obj1 = 125.00
138     Total movement of crane: 39.00
139     Total waiting time in berth position: 61.00
140     Total index of q during berthing: 542.00
141     Specific arrangement for each vessel:
142     V_id: 0 li: 8.0 xi: 4.0 bow of i: 0.0 tail of i: 8.0 gama_i0: 0.0 gama_i1: 1.0
143     duration_time_i: 1.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
144     V_id: 1 li: 3.0 xi: 9.5 bow of i: 8.0 tail of i: 11.0 gama_i0: 7.0 gama_i1: 11.
145     duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
146     V_id: 2 li: 3.0 xi: 2.0 bow of i: 0.5 tail of i: 3.5 gama_i0: 4.0 gama_i1: 7.0
147     duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
148     V_id: 3 li: 6.0 xi: 17.0 bow of i: 14.0 tail of i: 20.0 gama_i0: 2.0 gama_i1: 4
149     duration_time_i: 2.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
150     V_id: 4 li: 9.0 xi: 24.5 bow of i: 20.0 tail of i: 29.0 gama_i0: 11.0 gama_i1:
151     duration_time_i: 2.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
152     V_id: 5 li: 5.0 xi: 27.5 bow of i: 25.0 tail of i: 30.0 gama_i0: 4.0 gama_i1: 8
153     duration_time_i: 4.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
154     V_id: 6 li: 4.0 xi: 12.5 bow of i: 10.5 tail of i: 14.5 gama_i0: 4.0 gama_i1: 7
155     duration_time_i: 3.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
156     V_id: 7 li: 5.0 xi: 2.5 bow of i: 0.0 tail of i: 5.0 gama_i0: 1.0 gama_i1: 4.0
157     duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
158     V_id: 8 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 7.0 gama_i1: 9.0
159     duration_time_i: 2.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
160     V_id: 9 li: 4.0 xi: 2.0 bow of i: 0.0 tail of i: 4.0 gama_i0: 9.0 gama_i1: 12.0
161     duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
162     V_id: 10 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 12.0 gama_i1: 14.
163     duration_time_i: 2.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0

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unknown

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153
154 Algorithm finished and the total CPU time: 1285 s
155 End
156
```