


```

80  obj[gen-1] = 78.40  temp_best_value_gen = 78.40
81  No, maintain solution and obj[gen] = 78.40 , and the tolerance_counter = 5
82  solution chromosome =
83    first level: [ [ 4.5 13. 18.5 22.5 25.5 4. 2. 3. 2.5 2. 2. 2.5 1.5 4.5
84  3.5 2.5 2.5]
85    second level: [ 6. 5. 7. 0. 4. 1. 3. 8. 10. 12. 14. 16. 18. 20. 21. 25. 28.]
86    third level: [ 5. 6. 3. 5. 4. 4. 3. 3. 4. 2. 3. 4. 2. 8. 2. 3. 2.] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 78.40  temp_best_value_gen = 78.40
91  No, maintain solution and obj[gen] = 78.40 , and the tolerance_counter = 6
92  solution chromosome =
93    first level: [ [ 4.5 13. 18.5 22.5 25.5 4. 2. 3. 2.5 2. 2. 2.5 1.5 4.5
94  3.5 2.5 2.5]
95    second level: [ 6. 5. 7. 0. 4. 1. 3. 8. 10. 12. 14. 16. 18. 20. 21. 25. 28.]
96    third level: [ 5. 6. 3. 5. 4. 4. 3. 3. 4. 2. 3. 4. 2. 8. 2. 3. 2.] ]
97  The No. 6 iteration is finished!
98
99  Beging the No. 7 iteration:
100 obj[gen-1] = 78.40  temp_best_value_gen = 78.40
101 No, maintain solution and obj[gen] = 78.40 , and the tolerance_counter = 7
102 solution chromosome =
103   first level: [ [ 4.5 13. 18.5 22.5 25.5 4. 2. 3. 2.5 2. 2. 2.5 1.5 4.5
104 3.5 2.5 2.5]
105   second level: [ 6. 5. 7. 0. 4. 1. 3. 8. 10. 12. 14. 16. 18. 20. 21. 25. 28.]
106   third level: [ 5. 6. 3. 5. 4. 4. 3. 3. 4. 2. 3. 4. 2. 8. 2. 3. 2.] ]
107 The No. 7 iteration is finished!
108
109 -----
110
111 The iteration is terminated and then visulize the solution:
112 solution chromosome =
113   first level: [ [ 4.5 13. 18.5 22.5 25.5 4. 2. 3. 2.5 2. 2. 2.5 1.5 4.5
114 3.5 2.5 2.5]
115   second level: [ 6. 5. 7. 0. 4. 1. 3. 8. 10. 12. 14. 16. 18. 20. 21. 25. 28.]
116   third level: [ 5. 6. 3. 5. 4. 4. 3. 3. 4. 2. 3. 4. 2. 8. 2. 3. 2.] ]
117 Objective function values and some other indicators:
118 Obj0 = 30.00      Obj1 = 214.00      Obj0 + Obj1 = 244.00
119 Total movement of crane: 16.00
120 Total waiting time in berth position: 198.00
121 Total index of q during berthing: 464.00
122 Specific arrangement for each vessel:
123   V_id: 0      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 6.0      gama_i1: 8.0
124   duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
125   V_id: 1      li: 8.0      xi: 13.0      bow of i: 9.0      tail of i: 17.0      gama_i0: 5.0      gama_i1: 6
126   duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
127   V_id: 2      li: 3.0      xi: 18.5      bow of i: 17.0      tail of i: 20.0      gama_i0: 7.0      gama_i1:
128   duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
129   V_id: 3      li: 5.0      xi: 22.5      bow of i: 20.0      tail of i: 25.0      gama_i0: 0.0      gama_i1: 1
130   duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
131   V_id: 4      li: 9.0      xi: 25.5      bow of i: 21.0      tail of i: 30.0      gama_i0: 4.0      gama_i1: 6
132   duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
133   V_id: 5      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 1.0      gama_i1: 3.0
134   duration_time_i: 2.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
135   V_id: 6      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 3.0      gama_i1: 6.0
136   duration_time_i: 3.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
137   V_id: 7      li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 8.0      gama_i1: 10.0
138   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
139   V_id: 8      li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 10.0      gama_i1: 12.0
140   duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
141   V_id: 9      li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 12.0      gama_i1: 14.0
142   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
143   V_id: 10     li: 4.0      xi: 2.0      bow of i: 0.0      tail of i: 4.0      gama_i0: 14.0      gama_i1: 16.
144   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
145   V_id: 11     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 16.0      gama_i1: 18.
146   duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
147   V_id: 12     li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 18.0      gama_i1: 20.
148   duration_time_i: 2.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
149   V_id: 13     li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 20.0      gama_i1: 21.
150   duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
151   V_id: 14     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 21.0      gama_i1: 25.
152   duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
153   V_id: 15     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 25.0      gama_i1: 28.
154   duration_time_i: 3.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
155   V_id: 16     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 28.0      gama_i1: 31.
156   duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
157
158 Algorithm finished and the total CPU time: 1336 s
159 End
160

```