


```

80  obj[gen-1] = 80.80  temp_best_value_gen = 79.80
81  Yes, update solution and obj[gen] = 79.80
82  solution chromosome =
83    first level: [ [ 4. 11. 3. 4.5 28. 25.5 1.5 1.5 21.5 4. 1.5 3.5 3.5 4.
84  3.5 2.5 3. 15.5]
85    second level: [ 4. 2. 0. 5. 4. 2. 6. 2. 0. 10. 14. 26. 19. 21. 3. 28. 24. 4.]
86    third level: [ 7. 2. 3. 5. 1. 5. 2. 3. 4. 2. 2. 2. 3. 2. 6. 2. 4. 2. ] ]
87  The No. 5 iteration is finished!
88
89  Beging the No. 6 iteration:
90  obj[gen-1] = 79.80  temp_best_value_gen = 79.80
91  No, maintain solution and obj[gen] = 79.80 , and the tolerance_counter = 1
92  solution chromosome =
93    first level: [ [ 4. 11. 3. 4.5 28. 25.5 1.5 1.5 21.5 4. 1.5 3.5 3.5 4.
94  3.5 2.5 3. 15.5]
95    second level: [ 4. 2. 0. 5. 4. 2. 6. 2. 0. 10. 14. 26. 19. 21. 3. 28. 24. 4.]
96    third level: [ 7. 2. 3. 5. 1. 5. 2. 3. 4. 2. 2. 2. 3. 2. 6. 2. 4. 2. ] ]
97  The No. 6 iteration is finished!
98
99
100 -----
101 The iteration is terminated and then visulize the solution:
102 solution chromosome =
103   first level: [ [ 4. 11. 3. 4.5 28. 25.5 1.5 1.5 21.5 4. 1.5 3.5 3.5 4.
104  3.5 2.5 3. 15.5]
105   second level: [ 4. 2. 0. 5. 4. 2. 6. 2. 0. 10. 14. 26. 19. 21. 3. 28. 24. 4.]
106   third level: [ 7. 2. 3. 5. 1. 5. 2. 3. 4. 2. 2. 2. 3. 2. 6. 2. 4. 2. ] ]
107  Objective function values and some other indicators:
108  Obj0 = 30.00      Obj1 = 228.00      Obj0 + Obj1 = 258.00
109  Total movement of crane: 54.00
110  Total waiting time in berth position: 174.00
111  Total index of q during berthing: 471.00
112  Specific arrangement for each vessel:
113  V_id: 0      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 4.0      gama_i1: 5.0
114      duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
115  V_id: 1      li: 6.0      xi: 11.0      bow of i: 8.0      tail of i: 14.0      gama_i0: 2.0      gama_i1: 4
116      duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
117  V_id: 2      li: 3.0      xi: 3.0      bow of i: 1.5      tail of i: 4.5      gama_i0: 0.0      gama_i1: 2.0
118      duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
119  V_id: 3      li: 9.0      xi: 4.5      bow of i: 0.0      tail of i: 9.0      gama_i0: 5.0      gama_i1: 6.0
120      duration_time_i: 1.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
121  V_id: 4      li: 4.0      xi: 28.0      bow of i: 26.0      tail of i: 30.0      gama_i0: 4.0      gama_i1: 8
122      duration_time_i: 4.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
123  V_id: 5      li: 9.0      xi: 25.5      bow of i: 21.0      tail of i: 30.0      gama_i0: 2.0      gama_i1: 4
124      duration_time_i: 2.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
125  V_id: 6      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 6.0      gama_i1: 10.0
126      duration_time_i: 4.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
127  V_id: 7      li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 2.0      gama_i1: 3.0
128      duration_time_i: 1.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
129  V_id: 8      li: 8.0      xi: 21.5      bow of i: 17.5      tail of i: 25.5      gama_i0: 0.0      gama_i1: 2
130      duration_time_i: 2.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
131  V_id: 9      li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 10.0      gama_i1: 14.0
132      duration_time_i: 4.0      demand_i: 160.0      work load_i: 160.0      work load gap_i: 0
133  V_id: 10     li: 3.0      xi: 1.5      bow of i: 0.0      tail of i: 3.0      gama_i0: 14.0      gama_i1: 18.
134      duration_time_i: 4.0      demand_i: 140.0      work load_i: 140.0      work load gap_i: 0
135  V_id: 11     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 26.0      gama_i1: 28.
136      duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
137  V_id: 12     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 19.0      gama_i1: 21.
138      duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
139  V_id: 13     li: 8.0      xi: 4.0      bow of i: 0.0      tail of i: 8.0      gama_i0: 21.0      gama_i1: 24.
140      duration_time_i: 3.0      demand_i: 100.0      work load_i: 100.0      work load gap_i: 0
141  V_id: 14     li: 7.0      xi: 3.5      bow of i: 0.0      tail of i: 7.0      gama_i0: 3.0      gama_i1: 4.0
142      duration_time_i: 1.0      demand_i: 80.0      work load_i: 80.0      work load gap_i: 0
143  V_id: 15     li: 5.0      xi: 2.5      bow of i: 0.0      tail of i: 5.0      gama_i0: 28.0      gama_i1: 31.
144      duration_time_i: 3.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
145  V_id: 16     li: 6.0      xi: 3.0      bow of i: 0.0      tail of i: 6.0      gama_i0: 24.0      gama_i1: 26.
146      duration_time_i: 2.0      demand_i: 120.0      work load_i: 120.0      work load gap_i: 0
147  V_id: 17     li: 6.0      xi: 15.5      bow of i: 12.5      tail of i: 18.5      gama_i0: 4.0      gama_i1
148      duration_time_i: 2.0      demand_i: 60.0      work load_i: 60.0      work load gap_i: 0
149
150 Algorithm finished and the total CPU time: 1258 s
151 End
152

```