unknown

```
 1  "E:\1 □□□□\3 □□□□□\1 □□□□□□\1 □□□□□□□□\1_□□□□□□_□□□□\1_LW_□□□□2\6 □□□□\2 python code\01_My_Python_Code\Scripts\python.
    exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=38306
 2
 3  import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4  sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□\\1 □□□□□□□□\\1_□□□□□□_□□□□\\1_LW_□□□□2\\6 □□□□\\2 python code\\
    01_My_Python_Code', 'E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW_□□□□2/6 □□□□/2 python code/
    01_My_Python_Code'])
 5
 6  PyDev console: starting.
 7
 8  Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
 9  >>> runfile('E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW_□□□□2/6 □□□□/2 python code/01_My_Python_Code/
    main_BACASP_official_ENSGA-II.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□/1 □□□□□□□□/1_□□□□□□_□□□□/1_LW_□□□□2/6 □□□□/2
    python code/01_My_Python_Code')
10  Backend TkAgg is interactive backend. Turning interactive mode on.
11  Waiting 1s.....
12
13  This is the  R_12_1 _standerd_test.xlsx  optimization process solved by ENSGA-II algorithm.
14
15  Start
16
17  Before iteration:
18      Read basic data
19      Parameter setting:
20          trail =  58
21          Pop_size =  30
22          Tolerance_iteration_unchanged_number =  10
23          Chrom_size =  36
24          Iter_num_GA =  300
25          Select_rate =  0.85
26          Crossover_rate =  0.95
27          Mutation rate =  0.95
28          Mu_oper_type =  1
29          vessel_move_way =  2
30          coefficient for Obj1=  1.9
31          coefficient for Obj2=  0.10000000000000009
32          gen =  0
33
34  Iteration begin:
35  Beging the No. 0  iteration:
36      obj[0] = 29.80     temp_best_value_gen = 29.80
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
41      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 1
42      solution chromosome =
43          first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
44          second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
45          third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
50      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 2
51      solution chromosome =
52          first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
53          second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
54          third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
59      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 3
60      solution chromosome =
61          first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
62          second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
63          third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
68      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 4
69      solution chromosome =
70          first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
71          second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
72          third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
77      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 5
78      solution chromosome =
79          first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
```

```
80      second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
81      third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
82    The No. 5  iteration is finished!
83
84  Beging the No. 6  iteration:
85      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
86      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 6
87      solution chromosome =
88      first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
89      second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
90      third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
91    The No. 6  iteration is finished!
92
93  Beging the No. 7  iteration:
94      obj[gen-1] = 29.80   temp_best_value_gen = 29.80
95      No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 7
96      solution chromosome =
97      first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
98      second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
99      third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
100   The No. 7  iteration is finished!
101
102 Beging the No. 8  iteration:
103     obj[gen-1] = 29.80   temp_best_value_gen = 29.80
104     No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 8
105     solution chromosome =
106     first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
107     second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
108     third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
109   The No. 8  iteration is finished!
110
111 Beging the No. 9  iteration:
112     obj[gen-1] = 29.80   temp_best_value_gen = 29.80
113     No, maintain solution  and obj[gen] = 29.80 , and the tolerance_counter = 9
114     solution chromosome =
115     first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
116     second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
117     third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
118   The No. 9  iteration is finished!
119
120
121 ------------------------------------------------------------------------------------
122 The iteration is terminated and then visulize the solution:
123     solution chromosome =
124     first level: [ [ 4.5 10.5 13.5 17.  22.5 27.   2.5 27.  26.5 27.5 27.5 26. ]
125     second level:  [1. 1. 2. 1. 0. 2. 4. 1. 4. 6. 8. 5.]
126     third level:  [3. 3. 2. 2. 6. 4. 2. 6. 7. 5. 5. 6.] ]
127     Objective function values and some other indicators:
128     Obj0 = 9.00          Obj1 = 127.00          Obj0 + Obj1 = 136.00
129     Total movement of crane: 74.00
130     Total waiting time in berth position: 35.00
131     Total index of q during berthing: 1003.00
132     Specific arrangement for each vessel:
133     V_id: 0          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 1.0          gama_i1: 4.0
                         duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
134     V_id: 1          li: 3.0          xi: 10.5          bow of i: 9.0          tail of i: 12.0          gama_i0: 1.0          gama_i1: 2
        .0               duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
135     V_id: 2          li: 3.0          xi: 13.5          bow of i: 12.0          tail of i: 15.0          gama_i0: 2.0          gama_i1: 6
        .0               duration_time_i: 4.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
136     V_id: 3          li: 4.0          xi: 17.0          bow of i: 15.0          tail of i: 19.0          gama_i0: 1.0          gama_i1: 3
        .0               duration_time_i: 2.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
137     V_id: 4          li: 7.0          xi: 22.5          bow of i: 19.0          tail of i: 26.0          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
138     V_id: 5          li: 6.0          xi: 27.0          bow of i: 24.0          tail of i: 30.0          gama_i0: 2.0          gama_i1: 4
        .0               duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
139     V_id: 6          li: 5.0          xi: 2.5          bow of i: 0.0          tail of i: 5.0          gama_i0: 4.0          gama_i1: 8.0
                         duration_time_i: 4.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
140     V_id: 7          li: 6.0          xi: 27.0          bow of i: 24.0          tail of i: 30.0          gama_i0: 1.0          gama_i1: 2
        .0               duration_time_i: 1.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
141     V_id: 8          li: 7.0          xi: 26.5          bow of i: 23.0          tail of i: 30.0          gama_i0: 4.0          gama_i1: 5
        .0               duration_time_i: 1.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
142     V_id: 9          li: 5.0          xi: 27.5          bow of i: 25.0          tail of i: 30.0          gama_i0: 6.0          gama_i1: 8
        .0               duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
143     V_id: 10          li: 5.0          xi: 27.5          bow of i: 25.0          tail of i: 30.0          gama_i0: 8.0          gama_i1
        : 10.0            duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
144     V_id: 11          li: 8.0          xi: 26.0          bow of i: 22.0          tail of i: 30.0          gama_i0: 5.0          gama_i1
        : 6.0             duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
145
146 Algorithm finished and the total CPU time: 1309 s
147 End
148
```