```
 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=36906
 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_2_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 = 15
21          Pop_size = 10
22          Tolerance_iteration_unchanged_number = 8
23          Chrom_size = 6
24          Iter_num_GA = 300
25          Select_rate = 0.8
26          Crossover_rate = 0.75
27          Mutation rate = 0.95
28          Mu_oper_type = 1
29          vessel_move_way = 1
30          coefficient for Obj1= 0.5
31          coefficient for Obj2= 1.5
32          gen = 0
33
34  Iteration begin:
35  Beging the No. 0  iteration:
36      obj[0] = 7.00    temp_best_value_gen = 7.00
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 7.00    temp_best_value_gen = 7.00
41      No, maintain solution  and obj[gen] = 7.00 , and the tolerance_counter = 1
42      solution chromosome =
43          first level: [ [2. 8.]
44          second level:  [2. 1.]
45          third level:  [2. 7.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 7.00    temp_best_value_gen = 7.00
50      No, maintain solution  and obj[gen] = 7.00 , and the tolerance_counter = 2
51      solution chromosome =
52          first level: [ [2. 8.]
53          second level:  [2. 1.]
54          third level:  [2. 7.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 7.00    temp_best_value_gen = 7.00
59      No, maintain solution  and obj[gen] = 7.00 , and the tolerance_counter = 3
60      solution chromosome =
61          first level: [ [2. 8.]
62          second level:  [2. 1.]
63          third level:  [2. 7.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 7.00    temp_best_value_gen = 5.50
68      Yes, update solution and obj[gen] = 5.50
69      solution chromosome =
70          first level: [ [2. 8.]
71          second level:  [2. 0.]
72          third level:  [2. 4.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
77      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 1
78      solution chromosome =
79          first level: [ [2. 8.]
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 80        second level:  [2. 0.]
 81        third level:  [2. 4.] ]
 82      The No. 5  iteration is finished!
 83
 84    Beging the No. 6  iteration:
 85      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
 86      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 2
 87      solution chromosome =
 88        first level: [ [2. 8.]
 89        second level:  [2. 0.]
 90        third level:  [2. 4.] ]
 91      The No. 6  iteration is finished!
 92
 93    Beging the No. 7  iteration:
 94      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
 95      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 3
 96      solution chromosome =
 97        first level: [ [2. 8.]
 98        second level:  [2. 0.]
 99        third level:  [2. 4.] ]
100      The No. 7  iteration is finished!
101
102    Beging the No. 8  iteration:
103      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
104      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 4
105      solution chromosome =
106        first level: [ [2. 8.]
107        second level:  [2. 0.]
108        third level:  [2. 4.] ]
109      The No. 8  iteration is finished!
110
111    Beging the No. 9  iteration:
112      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
113      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 5
114      solution chromosome =
115        first level: [ [2. 8.]
116        second level:  [2. 0.]
117        third level:  [2. 4.] ]
118      The No. 9  iteration is finished!
119
120    Beging the No. 10  iteration:
121      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
122      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 6
123      solution chromosome =
124        first level: [ [2. 8.]
125        second level:  [2. 0.]
126        third level:  [2. 4.] ]
127      The No. 10  iteration is finished!
128
129    Beging the No. 11  iteration:
130      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
131      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 7
132      solution chromosome =
133        first level: [ [2. 8.]
134        second level:  [2. 0.]
135        third level:  [2. 4.] ]
136      The No. 11  iteration is finished!
137
138    Beging the No. 12  iteration:
139      obj[gen-1] = 5.50    temp_best_value_gen = 5.50
140      No, maintain solution  and obj[gen] = 5.50 , and the tolerance_counter = 8
141      solution chromosome =
142        first level: [ [2. 8.]
143        second level:  [2. 0.]
144        third level:  [2. 4.] ]
145      The No. 12  iteration is finished!
146
147
148    ------------------------------------------------------------------------------------
149    The iteration is terminated and then visulize the solution:
150      solution chromosome =
151        first level: [ [2. 8.]
152        second level:  [2. 0.]
153        third level:  [2. 4.] ]
154      Objective function values and some other indicators:
155        Obj0 = 5.00            Obj1 = 2.00            Obj0 + Obj1 = 7.00
156        Total movement of crane: 0.00
157        Total waiting time in berth position: 2.00
158        Total index of q during berthing: 35.00
159      Specific arrangement for each vessel:
160        V_id: 0          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 2.0          gama_i1: 6.0
                duration_time_i: 4.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
161        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: 2.0
                duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
```

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162
163   Algorithm finished and the total CPU time: 104 s
164   End
165
```