```
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=14255

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'])

6   PyDev console: starting.

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.....

13  This is the  R_2_1 _standerd_test.xlsx  optimization process solved by ENSGA-II algorithm.

15  Start

17  Before iteration:
18      Read basic data
19      Parameter setting:
20          trail =  55
21          Pop_size =  30
22          Tolerance_iteration_unchanged_number =  5
23          Chrom_size =  6
24          Iter_num_GA =  300
25          Select_rate =  0.85
26          Crossover_rate =  0.75
27          Mutation rate =  0.95
28          Mu_oper_type =  2
29          vessel_move_way =  1
30          coefficient for Obj1=  1.5
31          coefficient for Obj2=  0.5
32          gen =  0

34  Iteration begin:
35  Beging the No. 0  iteration:
36      obj[0] = 6.80    temp_best_value_gen = 6.80
37      The No. 0  iteration is finished!

39  Beging the No. 1  iteration:
40      obj[gen-1] = 6.80     temp_best_value_gen = 5.19
41      Yes, update solution and obj[gen] = 5.19
42      solution chromosome =
43          first level: [ [2.   4.01]
44          second level:  [1. 0.]
45          third level:  [3. 7.] ]
46      The No. 1  iteration is finished!

48  Beging the No. 2  iteration:
49      obj[gen-1] = 5.19     temp_best_value_gen = 5.19
50      No, maintain solution  and obj[gen] = 5.19 , and the tolerance_counter = 1
51      solution chromosome =
52          first level: [ [2.   4.01]
53          second level:  [1. 0.]
54          third level:  [3. 7.] ]
55      The No. 2  iteration is finished!

57  Beging the No. 3  iteration:
58      obj[gen-1] = 5.19     temp_best_value_gen = 4.19
59      Yes, update solution and obj[gen] = 4.19
60      solution chromosome =
61          first level: [ [2.   4.01]
62          second level:  [0. 2.]
63          third level:  [4. 7.] ]
64      The No. 3  iteration is finished!

66  Beging the No. 4  iteration:
67      obj[gen-1] = 4.19     temp_best_value_gen = 4.19
68      No, maintain solution  and obj[gen] = 4.19 , and the tolerance_counter = 1
69      solution chromosome =
70          first level: [ [2.   4.01]
71          second level:  [0. 2.]
72          third level:  [4. 7.] ]
73      The No. 4  iteration is finished!

75  Beging the No. 5  iteration:
76      obj[gen-1] = 4.19     temp_best_value_gen = 4.19
77      No, maintain solution  and obj[gen] = 4.19 , and the tolerance_counter = 2
78      solution chromosome =
79          first level: [ [2.   4.01]
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 80        second level:  [0. 2.]
 81        third level:  [4. 7.] ]
 82      The No. 5  iteration is finished!
 83
 84    Beging the No. 6  iteration:
 85      obj[gen-1] = 4.19    temp_best_value_gen = 4.19
 86      No, maintain solution  and obj[gen] = 4.19 , and the tolerance_counter = 3
 87      solution chromosome =
 88        first level: [ [2.   4.01]
 89        second level:  [0. 2.]
 90        third level:  [4. 7.] ]
 91      The No. 6  iteration is finished!
 92
 93    Beging the No. 7  iteration:
 94      obj[gen-1] = 4.19    temp_best_value_gen = 4.19
 95      No, maintain solution  and obj[gen] = 4.19 , and the tolerance_counter = 4
 96      solution chromosome =
 97        first level: [ [2.   4.01]
 98        second level:  [0. 2.]
 99        third level:  [4. 7.] ]
100      The No. 7  iteration is finished!
101
102    Beging the No. 8  iteration:
103      obj[gen-1] = 4.19    temp_best_value_gen = 4.19
104      No, maintain solution  and obj[gen] = 4.19 , and the tolerance_counter = 5
105      solution chromosome =
106        first level: [ [2.   4.01]
107        second level:  [0. 2.]
108        third level:  [4. 7.] ]
109      The No. 8  iteration is finished!
110
111
112    -----------------------------------------------------------------------------------
113    The iteration is terminated and then visulize the solution:
114      solution chromosome =
115        first level: [ [2.   4.01]
116        second level:  [0. 2.]
117        third level:  [4. 7.] ]
118      Objective function values and some other indicators:
119      Obj0 = 2.00          Obj1 = 2.38          Obj0 + Obj1 = 4.38
120      Total movement of crane: 0.38
121      Total waiting time in berth position: 2.00
122      Total index of q during berthing: 27.00
123      Specific arrangement for each vessel:
124      V_id: 0          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 0.0          gama_i1: 2.0
                 duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
125      V_id: 1          li: 8.0          xi: 4.0          bow of i: 0.0          tail of i: 8.0          gama_i0: 2.0          gama_i1: 3.0
                 duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
126
127    Algorithm finished and the total CPU time: 230 s
128    End
129
```