```
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=13222
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 =  53
21       Pop_size =  30
22       Tolerance_iteration_unchanged_number =  5
23       Chrom_size =  6
24       Iter_num_GA =  300
25       Select_rate =  0.75
26       Crossover_rate =  0.8
27       Mutation rate =  0.9
28       Mu_oper_type =  2
29       vessel_move_way =  2
30       coefficient for Obj1=  1.5
31       coefficient for Obj2=  0.5
32       gen =  0
33
34 Iteration begin:
35 Beging the No. 0  iteration:
36    obj[0] = 9.08    temp_best_value_gen = 9.08
37    The No. 0  iteration is finished!
38
39 Beging the No. 1  iteration:
40    obj[gen-1] = 9.08     temp_best_value_gen = 7.34
41    Yes, update solution and obj[gen] = 7.34
42    solution chromosome =
43       first level: [ [2.42 4.01]
44       second level:  [2. 0.]
45       third level:  [4. 8.] ]
46    The No. 1  iteration is finished!
47
48 Beging the No. 2  iteration:
49    obj[gen-1] = 7.34     temp_best_value_gen = 7.20
50    Yes, update solution and obj[gen] = 7.20
51    solution chromosome =
52       first level: [ [2.42 4.  ]
53       second level:  [2. 0.]
54       third level:  [4. 8.] ]
55    The No. 2  iteration is finished!
56
57 Beging the No. 3  iteration:
58    obj[gen-1] = 7.20     temp_best_value_gen = 6.43
59    Yes, update solution and obj[gen] = 6.43
60    solution chromosome =
61       first level: [ [2.05 4.11]
62       second level:  [0. 2.]
63       third level:  [4. 8.] ]
64    The No. 3  iteration is finished!
65
66 Beging the No. 4  iteration:
67    obj[gen-1] = 6.43     temp_best_value_gen = 6.43
68    No, maintain solution  and obj[gen] = 6.43 , and the tolerance_counter = 1
69    solution chromosome =
70       first level: [ [2.05 4.11]
71       second level:  [0. 2.]
72       third level:  [4. 8.] ]
73    The No. 4  iteration is finished!
74
75 Beging the No. 5  iteration:
76    obj[gen-1] = 6.43     temp_best_value_gen = 6.43
77    No, maintain solution  and obj[gen] = 6.43 , and the tolerance_counter = 2
78    solution chromosome =
79       first level: [ [2.05 4.11]
```

```
 80        second level:  [0. 2.]
 81        third level:  [4. 8.] ]
 82     The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85     obj[gen-1] = 6.43    temp_best_value_gen = 6.43
 86     No, maintain solution  and obj[gen] = 6.43 , and the tolerance_counter = 3
 87     solution chromosome =
 88        first level: [ [2.05 4.11]
 89        second level:  [0. 2.]
 90        third level:  [4. 8.] ]
 91     The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94     obj[gen-1] = 6.43    temp_best_value_gen = 6.43
 95     No, maintain solution  and obj[gen] = 6.43 , and the tolerance_counter = 4
 96     solution chromosome =
 97        first level: [ [2.05 4.11]
 98        second level:  [0. 2.]
 99        third level:  [4. 8.] ]
100     The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103     obj[gen-1] = 6.43    temp_best_value_gen = 6.43
104     No, maintain solution  and obj[gen] = 6.43 , and the tolerance_counter = 5
105     solution chromosome =
106        first level: [ [2.05 4.11]
107        second level:  [0. 2.]
108        third level:  [4. 8.] ]
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: [ [2.05 4.11]
116        second level:  [0. 2.]
117        third level:  [4. 8.] ]
118     Objective function values and some other indicators:
119        Obj0 = 2.00          Obj1 = 6.86          Obj0 + Obj1 = 8.86
120        Total movement of crane: 4.86
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: 2.1          bow of i: 0.1          tail of i: 4.1          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: 4.1          bow of i: 0.1          tail of i: 8.1          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: 239 s
128  End
129
```