```
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=32523
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 =  17
21       Pop_size =  20
22       Tolerance_iteration_unchanged_number =  8
23       Chrom_size =  6
24       Iter_num_GA =  300
25       Select_rate =  0.75
26       Crossover_rate =  0.8
27       Mutation rate =  0.95
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] = 11.71     temp_best_value_gen = 11.71
37   The No. 0  iteration is finished!
38
39 Beging the No. 1  iteration:
40   obj[gen-1] = 11.71   temp_best_value_gen = 8.13
41   Yes, update solution and obj[gen] = 8.13
42   solution chromosome =
43     first level: [ [2.09 8.  ]
44     second level:  [0. 3.]
45     third level:  [3. 8.] ]
46   The No. 1  iteration is finished!
47
48 Beging the No. 2  iteration:
49   obj[gen-1] = 8.13     temp_best_value_gen = 8.13
50   No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 1
51   solution chromosome =
52     first level: [ [2.09 8.  ]
53     second level:  [0. 3.]
54     third level:  [3. 8.] ]
55   The No. 2  iteration is finished!
56
57 Beging the No. 3  iteration:
58   obj[gen-1] = 8.13     temp_best_value_gen = 8.13
59   No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 2
60   solution chromosome =
61     first level: [ [2.09 8.  ]
62     second level:  [0. 3.]
63     third level:  [3. 8.] ]
64   The No. 3  iteration is finished!
65
66 Beging the No. 4  iteration:
67   obj[gen-1] = 8.13     temp_best_value_gen = 8.13
68   No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 3
69   solution chromosome =
70     first level: [ [2.09 8.  ]
71     second level:  [0. 3.]
72     third level:  [3. 8.] ]
73   The No. 4  iteration is finished!
74
75 Beging the No. 5  iteration:
76   obj[gen-1] = 8.13     temp_best_value_gen = 8.13
77   No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 4
78   solution chromosome =
79     first level: [ [2.09 8.  ]
```

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 80        second level:  [0. 3.]
 81        third level:  [3. 8.] ]
 82      The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85      obj[gen-1] = 8.13    temp_best_value_gen = 8.13
 86      No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 5
 87      solution chromosome =
 88        first level: [ [2.09 8.  ]
 89        second level:  [0. 3.]
 90        third level:  [3. 8.] ]
 91      The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94      obj[gen-1] = 8.13    temp_best_value_gen = 8.13
 95      No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 6
 96      solution chromosome =
 97        first level: [ [2.09 8.  ]
 98        second level:  [0. 3.]
 99        third level:  [3. 8.] ]
100      The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103      obj[gen-1] = 8.13    temp_best_value_gen = 8.13
104      No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 7
105      solution chromosome =
106        first level: [ [2.09 8.  ]
107        second level:  [0. 3.]
108        third level:  [3. 8.] ]
109      The No. 8  iteration is finished!
110
111  Beging the No. 9  iteration:
112      obj[gen-1] = 8.13    temp_best_value_gen = 8.13
113      No, maintain solution  and obj[gen] = 8.13 , and the tolerance_counter = 8
114      solution chromosome =
115        first level: [ [2.09 8.  ]
116        second level:  [0. 3.]
117        third level:  [3. 8.] ]
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: [ [2.09 8.  ]
125        second level:  [0. 3.]
126        third level:  [3. 8.] ]
127      Objective function values and some other indicators:
128      Obj0 = 3.00          Obj1 = 7.27          Obj0 + Obj1 = 10.27
129      Total movement of crane: 4.27
130      Total waiting time in berth position: 3.00
131      Total index of q during berthing: 46.00
132      Specific arrangement for each vessel:
133      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: 3.0
                 duration_time_i: 3.0         demand_i: 160.0        work load_i: 160.0        work load gap_i: 0
134      V_id:  1           li: 8.0           xi: 8.0           bow of i: 4.0           tail of i: 12.0           gama_i0: 3.0           gama_i1: 4.0
                 duration_time_i: 1.0         demand_i: 120.0        work load_i: 120.0        work load gap_i: 0
135
136  Algorithm finished and the total CPU time: 194 s
137  End
138
```