```
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=11758
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 = 7
21       Pop_size = 30
22       Tolerance_iteration_unchanged_number = 5
23       Chrom_size = 6
24       Iter_num_GA = 300
25       Select_rate = 0.9
26       Crossover_rate = 0.75
27       Mutation rate = 0.8
28       Mu_oper_type = 2
29       vessel_move_way = 2
30       coefficient for Obj1= 1.0
31       coefficient for Obj2= 1.0
32       gen = 0
33
34 Iteration begin:
35 Beging the No. 0  iteration:
36    obj[0] = 10.63     temp_best_value_gen = 10.63
37    The No. 0  iteration is finished!
38
39 Beging the No. 1  iteration:
40    obj[gen-1] = 10.63   temp_best_value_gen = 10.63
41    No, maintain solution  and obj[gen] = 10.63 , and the tolerance_counter = 1
42    solution chromosome =
43       first level: [ [2.77 4.04]
44       second level:  [1. 0.]
45       third level:  [4. 7.] ]
46    The No. 1  iteration is finished!
47
48 Beging the No. 2  iteration:
49    obj[gen-1] = 10.63   temp_best_value_gen = 10.43
50    Yes, update solution and obj[gen] = 10.43
51    solution chromosome =
52       first level: [ [2.18 5.05]
53       second level:  [3. 0.]
54       third level:  [4. 7.] ]
55    The No. 2  iteration is finished!
56
57 Beging the No. 3  iteration:
58    obj[gen-1] = 10.43   temp_best_value_gen = 8.87
59    Yes, update solution and obj[gen] = 8.87
60    solution chromosome =
61       first level: [ [2.06 5.01]
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] = 8.87     temp_best_value_gen = 8.38
68    Yes, update solution and obj[gen] = 8.38
69    solution chromosome =
70       first level: [ [2.  4.01]
71       second level:  [3. 0.]
72       third level:  [3. 8.] ]
73    The No. 4  iteration is finished!
74
75 Beging the No. 5  iteration:
76    obj[gen-1] = 8.38     temp_best_value_gen = 8.38
77    No, maintain solution  and obj[gen] = 8.38 , and the tolerance_counter = 1
78    solution chromosome =
79       first level: [ [2.  4.01]
```

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80       second level:  [3. 0.]
81       third level:  [3. 8.] ]
82    The No. 5  iteration is finished!
83
84  Beging the No. 6  iteration:
85     obj[gen-1] = 8.38    temp_best_value_gen = 8.38
86     No, maintain solution  and obj[gen] = 8.38 , and the tolerance_counter = 2
87     solution chromosome =
88       first level: [ [2.   4.01]
89       second level:  [3. 0.]
90       third level:  [3. 8.] ]
91    The No. 6  iteration is finished!
92
93  Beging the No. 7  iteration:
94     obj[gen-1] = 8.38    temp_best_value_gen = 8.38
95     No, maintain solution  and obj[gen] = 8.38 , and the tolerance_counter = 3
96     solution chromosome =
97       first level: [ [2.   4.01]
98       second level:  [3. 0.]
99       third level:  [3. 8.] ]
100   The No. 7  iteration is finished!
101
102 Beging the No. 8  iteration:
103    obj[gen-1] = 8.38    temp_best_value_gen = 8.38
104    No, maintain solution  and obj[gen] = 8.38 , and the tolerance_counter = 4
105    solution chromosome =
106      first level: [ [2.   4.01]
107      second level:  [3. 0.]
108      third level:  [3. 8.] ]
109   The No. 8  iteration is finished!
110
111 Beging the No. 9  iteration:
112    obj[gen-1] = 8.38    temp_best_value_gen = 8.38
113    No, maintain solution  and obj[gen] = 8.38 , and the tolerance_counter = 5
114    solution chromosome =
115      first level: [ [2.   4.01]
116      second level:  [3. 0.]
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.   4.01]
125      second level:  [3. 0.]
126      third level:  [3. 8.] ]
127    Objective function values and some other indicators:
128    Obj0 = 5.00            Obj1 = 3.38            Obj0 + Obj1 = 8.38
129    Total movement of crane: 0.38
130    Total waiting time in berth position: 3.00
131    Total index of q during berthing: 22.00
132    Specific arrangement for each vessel:
133    V_id:  0           li: 4.0           xi: 2.0           bow of i: 0.0           tail of i: 4.0           gama_i0: 3.0           gama_i1: 6.0
                 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: 4.0           bow of i: 0.0           tail of i: 8.0           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
135
136 Algorithm finished and the total CPU time: 279 s
137 End
138
```