```
 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=14124
 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 =  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
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:  [1. 1.]
45          third level:  [2. 2.] ]
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:  [1. 1.]
54          third level:  [2. 2.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 7.00     temp_best_value_gen = 6.48
59      Yes, update solution and obj[gen] = 6.48
60      solution chromosome =
61          first level: [ [2.22 4.04]
62          second level:  [1. 0.]
63          third level:  [3. 8.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 6.48     temp_best_value_gen = 6.48
68      No, maintain solution  and obj[gen] = 6.48 , and the tolerance_counter = 1
69      solution chromosome =
70          first level: [ [2.22 4.04]
71          second level:  [1. 0.]
72          third level:  [3. 8.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 6.48    temp_best_value_gen = 6.48
77      No, maintain solution  and obj[gen] = 6.48 , and the tolerance_counter = 2
78      solution chromosome =
79          first level: [ [2.22 4.04]
```

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80          second level:  [1. 0.]
81          third level:  [3. 8.] ]
82        The No. 5  iteration is finished!
83
84     Beging the No. 6  iteration:
85        obj[gen-1] = 6.48    temp_best_value_gen = 6.48
86        No, maintain solution  and obj[gen] = 6.48 , and the tolerance_counter = 3
87        solution chromosome =
88          first level: [ [2.22 4.04]
89          second level:  [1. 0.]
90          third level:  [3. 8.] ]
91        The No. 6  iteration is finished!
92
93     Beging the No. 7  iteration:
94        obj[gen-1] = 6.48    temp_best_value_gen = 6.48
95        No, maintain solution  and obj[gen] = 6.48 , and the tolerance_counter = 4
96        solution chromosome =
97          first level: [ [2.22 4.04]
98          second level:  [1. 0.]
99          third level:  [3. 8.] ]
100       The No. 7  iteration is finished!
101
102    Beging the No. 8  iteration:
103       obj[gen-1] = 6.48    temp_best_value_gen = 6.48
104       No, maintain solution  and obj[gen] = 6.48 , and the tolerance_counter = 5
105       solution chromosome =
106         first level: [ [2.22 4.04]
107         second level:  [1. 0.]
108         third level:  [3. 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: [ [2.22 4.04]
116         second level:  [1. 0.]
117         third level:  [3. 8.] ]
118       Objective function values and some other indicators:
119       Obj0 = 3.00          Obj1 = 3.96          Obj0 + Obj1 = 6.96
120       Total movement of crane: 2.96
121       Total waiting time in berth position: 1.00
122       Total index of q during berthing: 22.00
123       Specific arrangement for each vessel:
124       V_id: 0          li: 4.0          xi: 2.2          bow of i: 0.2          tail of i: 4.2          gama_i0: 1.0          gama_i1: 4.0
                    duration_time_i: 3.0          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: 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
126
127    Algorithm finished and the total CPU time: 230 s
128    End
129
```