```
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=54285
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] = 8.63    temp_best_value_gen = 8.63
37    The No. 0  iteration is finished!
38
39 Beging the No. 1  iteration:
40    obj[gen-1] = 8.63     temp_best_value_gen = 7.41
41    Yes, update solution and obj[gen] = 7.41
42    solution chromosome =
43       first level: [ [2.06 5.08]
44       second level:  [0. 2.]
45       third level:  [4. 5.] ]
46    The No. 1  iteration is finished!
47
48 Beging the No. 2  iteration:
49    obj[gen-1] = 7.41     temp_best_value_gen = 5.29
50    Yes, update solution and obj[gen] = 5.29
51    solution chromosome =
52       first level: [ [2.02 4.06]
53       second level:  [0. 2.]
54       third level:  [4. 8.] ]
55    The No. 2  iteration is finished!
56
57 Beging the No. 3  iteration:
58    obj[gen-1] = 5.29     temp_best_value_gen = 5.29
59    No, maintain solution  and obj[gen] = 5.29 , and the tolerance_counter = 1
60    solution chromosome =
61       first level: [ [2.02 4.06]
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] = 5.29     temp_best_value_gen = 5.29
68    No, maintain solution  and obj[gen] = 5.29 , and the tolerance_counter = 2
69    solution chromosome =
70       first level: [ [2.02 4.06]
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] = 5.29     temp_best_value_gen = 5.29
77    No, maintain solution  and obj[gen] = 5.29 , and the tolerance_counter = 3
78    solution chromosome =
79       first level: [ [2.02 4.06]
```

```
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] = 5.29    temp_best_value_gen = 5.29
86     No, maintain solution  and obj[gen] = 5.29 , and the tolerance_counter = 4
87     solution chromosome =
88        first level: [ [2.02 4.06]
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] = 5.29    temp_best_value_gen = 5.29
95     No, maintain solution  and obj[gen] = 5.29 , and the tolerance_counter = 5
96     solution chromosome =
97        first level: [ [2.02 4.06]
98        second level:  [0. 2.]
99        third level:  [4. 8.] ]
100    The No. 7  iteration is finished!
101
102
103    -----------------------------------------------------------------------------
104   The iteration is terminated and then visulize the solution:
105     solution chromosome =
106        first level: [ [2.02 4.06]
107        second level:  [0. 2.]
108        third level:  [4. 8.] ]
109     Objective function values and some other indicators:
110        Obj0 = 2.00            Obj1 = 4.59          Obj0 + Obj1 = 6.59
111        Total movement of crane: 2.59
112        Total waiting time in berth position: 2.00
113        Total index of q during berthing: 27.00
114     Specific arrangement for each vessel:
115        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
116        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
117
118   Algorithm finished and the total CPU time: 191 s
119   End
120
```