```
 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=3842
 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 =  21
21          Pop_size =  30
22          Tolerance_iteration_unchanged_number =  8
23          Chrom_size =  6
24          Iter_num_GA =  300
25          Select_rate =  0.75
26          Crossover_rate =  0.75
27          Mutation rate =  0.75
28          Mu_oper_type =  2
29          vessel_move_way =  1
30          coefficient for Obj1=  1.9
31          coefficient for Obj2=  0.10000000000000009
32          gen =  0
33
34  Iteration begin:
35  Beging the No. 0  iteration:
36      obj[0] = 6.27    temp_best_value_gen = 6.27
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 6.27     temp_best_value_gen = 6.27
41      No, maintain solution  and obj[gen] = 6.27 , and the tolerance_counter = 1
42      solution chromosome =
43          first level: [ [2.26 4.02]
44          second level:  [2. 1.]
45          third level:  [4. 6.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 6.27    temp_best_value_gen = 4.07
50      Yes, update solution and obj[gen] = 4.07
51      solution chromosome =
52          first level: [ [2.14 4.02]
53          second level:  [1. 0.]
54          third level:  [4. 6.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 4.07     temp_best_value_gen = 4.07
59      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 1
60      solution chromosome =
61          first level: [ [2.14 4.02]
62          second level:  [1. 0.]
63          third level:  [4. 6.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 4.07     temp_best_value_gen = 4.07
68      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 2
69      solution chromosome =
70          first level: [ [2.14 4.02]
71          second level:  [1. 0.]
72          third level:  [4. 6.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 4.07     temp_best_value_gen = 4.07
77      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 3
78      solution chromosome =
79          first level: [ [2.14 4.02]
```

```
 80        second level:  [1. 0.]
 81        third level:  [4. 6.] ]
 82      The No. 5  iteration is finished!
 83
 84   Beging the No. 6  iteration:
 85      obj[gen-1] = 4.07    temp_best_value_gen = 4.07
 86      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 4
 87      solution chromosome =
 88        first level: [ [2.14 4.02]
 89        second level:  [1. 0.]
 90        third level:  [4. 6.] ]
 91      The No. 6  iteration is finished!
 92
 93   Beging the No. 7  iteration:
 94      obj[gen-1] = 4.07    temp_best_value_gen = 4.07
 95      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 5
 96      solution chromosome =
 97        first level: [ [2.14 4.02]
 98        second level:  [1. 0.]
 99        third level:  [4. 6.] ]
100      The No. 7  iteration is finished!
101
102   Beging the No. 8  iteration:
103      obj[gen-1] = 4.07    temp_best_value_gen = 4.07
104      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 6
105      solution chromosome =
106        first level: [ [2.14 4.02]
107        second level:  [1. 0.]
108        third level:  [4. 6.] ]
109      The No. 8  iteration is finished!
110
111   Beging the No. 9  iteration:
112      obj[gen-1] = 4.07    temp_best_value_gen = 4.07
113      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 7
114      solution chromosome =
115        first level: [ [2.14 4.02]
116        second level:  [1. 0.]
117        third level:  [4. 6.] ]
118      The No. 9  iteration is finished!
119
120   Beging the No. 10  iteration:
121      obj[gen-1] = 4.07    temp_best_value_gen = 4.07
122      No, maintain solution  and obj[gen] = 4.07 , and the tolerance_counter = 8
123      solution chromosome =
124        first level: [ [2.14 4.02]
125        second level:  [1. 0.]
126        third level:  [4. 6.] ]
127      The No. 10  iteration is finished!
128
129
130   ----------------------------------------------------------------------------
131   The iteration is terminated and then visulize the solution:
132      solution chromosome =
133        first level: [ [2.14 4.02]
134        second level:  [1. 0.]
135        third level:  [4. 6.] ]
136      Objective function values and some other indicators:
137      Obj0 = 2.00          Obj1 = 2.74          Obj0 + Obj1 = 4.74
138      Total movement of crane: 1.74
139      Total waiting time in berth position: 1.00
140      Total index of q during berthing: 27.00
141   Specific arrangement for each vessel:
```

V_id	li	xi	bow of i	tail of i	gama_i0	gama_i1
142 V_id: 0	li: 4.0	xi: 2.1	bow of i: 0.1	tail of i: 4.1	gama_i0: 1.0	gama_i1: 3.0
	duration_time_i: 2.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
143 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		

```
144
145   Algorithm finished and the total CPU time: 242 s
146   End
147
```