```
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=14616
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_4_8 _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 =  58
21       Pop_size =  30
22       Tolerance_iteration_unchanged_number =  10
23       Chrom_size =  12
24       Iter_num_GA =  300
25       Select_rate =  0.85
26       Crossover_rate =  0.95
27       Mutation rate =  0.95
28       Mu_oper_type =  1
29       vessel_move_way =  2
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] = 6.30   temp_best_value_gen = 6.30
37    The No. 0  iteration is finished!
38
39 Beging the No. 1  iteration:
40    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
41    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 1
42    solution chromosome =
43       first level: [ [ 3.   7.5 11.5 18. ]
44       second level:  [1. 0. 2. 3.]
45       third level:  [2. 3. 3. 7.] ]
46    The No. 1  iteration is finished!
47
48 Beging the No. 2  iteration:
49    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
50    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 2
51    solution chromosome =
52       first level: [ [ 3.   7.5 11.5 18. ]
53       second level:  [1. 0. 2. 3.]
54       third level:  [2. 3. 3. 7.] ]
55    The No. 2  iteration is finished!
56
57 Beging the No. 3  iteration:
58    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
59    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 3
60    solution chromosome =
61       first level: [ [ 3.   7.5 11.5 18. ]
62       second level:  [1. 0. 2. 3.]
63       third level:  [2. 3. 3. 7.] ]
64    The No. 3  iteration is finished!
65
66 Beging the No. 4  iteration:
67    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
68    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 4
69    solution chromosome =
70       first level: [ [ 3.   7.5 11.5 18. ]
71       second level:  [1. 0. 2. 3.]
72       third level:  [2. 3. 3. 7.] ]
73    The No. 4  iteration is finished!
74
75 Beging the No. 5  iteration:
76    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
77    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 5
78    solution chromosome =
79       first level: [ [ 3.   7.5 11.5 18. ]
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 80      second level: [1. 0. 2. 3.]
 81      third level: [2. 3. 3. 7.] ]
 82    The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
 86    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 6
 87    solution chromosome =
 88      first level: [ [ 3.   7.5 11.5 18. ]
 89      second level: [1. 0. 2. 3.]
 90      third level: [2. 3. 3. 7.] ]
 91    The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
 95    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 7
 96    solution chromosome =
 97      first level: [ [ 3.   7.5 11.5 18. ]
 98      second level: [1. 0. 2. 3.]
 99      third level: [2. 3. 3. 7.] ]
100    The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
104    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 8
105    solution chromosome =
106      first level: [ [ 3.   7.5 11.5 18. ]
107      second level: [1. 0. 2. 3.]
108      third level: [2. 3. 3. 7.] ]
109    The No. 8  iteration is finished!
110
111  Beging the No. 9  iteration:
112    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
113    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 9
114    solution chromosome =
115      first level: [ [ 3.   7.5 11.5 18. ]
116      second level: [1. 0. 2. 3.]
117      third level: [2. 3. 3. 7.] ]
118    The No. 9  iteration is finished!
119
120  Beging the No. 10  iteration:
121    obj[gen-1] = 6.30    temp_best_value_gen = 6.30
122    No, maintain solution  and obj[gen] = 6.30 , and the tolerance_counter = 10
123    solution chromosome =
124      first level: [ [ 3.   7.5 11.5 18. ]
125      second level: [1. 0. 2. 3.]
126      third level: [2. 3. 3. 7.] ]
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: [ [ 3.   7.5 11.5 18. ]
134      second level: [1. 0. 2. 3.]
135      third level: [2. 3. 3. 7.] ]
136    Objective function values and some other indicators:
137    Obj0 = 3.00          Obj1 = 6.00          Obj0 + Obj1 = 9.00
138    Total movement of crane: 0.00
139    Total waiting time in berth position: 6.00
140    Total index of q during berthing: 116.00
141    Specific arrangement for each vessel:
142    V_id: 0        li: 6.0        xi: 3.0        bow of i: 0.0        tail of i: 6.0        gama_i0: 1.0        gama_i1: 3.0
               duration_time_i: 2.0        demand_i: 60.0        work load_i: 60.0        work load gap_i: 0
143    V_id: 1        li: 3.0        xi: 7.5        bow of i: 6.0        tail of i: 9.0        gama_i0: 0.0        gama_i1: 1.0
               duration_time_i: 1.0        demand_i: 60.0        work load_i: 60.0        work load gap_i: 0
144    V_id: 2        li: 5.0        xi: 11.5       bow of i: 9.0        tail of i: 14.0       gama_i0: 2.0        gama_i1: 4
    .0             duration_time_i: 2.0        demand_i: 100.0       work load_i: 100.0       work load gap_i: 0
145    V_id: 3        li: 8.0        xi: 18.0       bow of i: 14.0       tail of i: 22.0       gama_i0: 3.0        gama_i1: 4
    .0             duration_time_i: 1.0        demand_i: 60.0        work load_i: 60.0        work load gap_i: 0
146
147  Algorithm finished and the total CPU time: 869 s
148  End
149
```