```
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=38276
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_12_6 _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 =  36
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] = 46.60      temp_best_value_gen = 46.60
37    The No. 0  iteration is finished!
38
39 Beging the No. 1  iteration:
40    obj[gen-1] = 46.60   temp_best_value_gen = 46.60
41    No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 1
42    solution chromosome =
43       first level: [ [ 4.  10.  16.5 25.  25.5  4.5  3.5  3.   4.5  1.5  2.5  3. ]
44       second level:  [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
45       third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
46    The No. 1  iteration is finished!
47
48 Beging the No. 2  iteration:
49    obj[gen-1] = 46.60   temp_best_value_gen = 46.60
50    No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 2
51    solution chromosome =
52       first level: [ [ 4.  10.  16.5 25.  25.5  4.5  3.5  3.   4.5  1.5  2.5  3. ]
53       second level:  [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
54       third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
55    The No. 2  iteration is finished!
56
57 Beging the No. 3  iteration:
58    obj[gen-1] = 46.60   temp_best_value_gen = 46.60
59    No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 3
60    solution chromosome =
61       first level: [ [ 4.  10.  16.5 25.  25.5  4.5  3.5  3.   4.5  1.5  2.5  3. ]
62       second level:  [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
63       third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
64    The No. 3  iteration is finished!
65
66 Beging the No. 4  iteration:
67    obj[gen-1] = 46.60   temp_best_value_gen = 46.60
68    No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 4
69    solution chromosome =
70       first level: [ [ 4.  10.  16.5 25.  25.5  4.5  3.5  3.   4.5  1.5  2.5  3. ]
71       second level:  [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
72       third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
73    The No. 4  iteration is finished!
74
75 Beging the No. 5  iteration:
76    obj[gen-1] = 46.60   temp_best_value_gen = 46.60
77    No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 5
78    solution chromosome =
79       first level: [ [ 4.  10.  16.5 25.  25.5  4.5  3.5  3.   4.5  1.5  2.5  3. ]
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 80        second level: [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
 81        third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
 82     The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85     obj[gen-1] = 46.60   temp_best_value_gen = 46.60
 86     No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 6
 87     solution chromosome =
 88        first level: [ [ 4.  10.  16.5 25.  25.5 4.5  3.5  3.   4.5 1.5  2.5  3. ]
 89        second level: [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
 90        third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
 91     The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94     obj[gen-1] = 46.60   temp_best_value_gen = 46.60
 95     No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 7
 96     solution chromosome =
 97        first level: [ [ 4.  10.  16.5 25.  25.5 4.5  3.5  3.   4.5 1.5  2.5  3. ]
 98        second level: [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
 99        third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
100     The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103     obj[gen-1] = 46.60   temp_best_value_gen = 46.60
104     No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 8
105     solution chromosome =
106        first level: [ [ 4.  10.  16.5 25.  25.5 4.5  3.5  3.   4.5 1.5  2.5  3. ]
107        second level: [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
108        third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
109     The No. 8  iteration is finished!
110
111  Beging the No. 9  iteration:
112     obj[gen-1] = 46.60   temp_best_value_gen = 46.60
113     No, maintain solution  and obj[gen] = 46.60 , and the tolerance_counter = 9
114     solution chromosome =
115        first level: [ [ 4.  10.  16.5 25.  25.5 4.5  3.5  3.   4.5 1.5  2.5  3. ]
116        second level: [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
117        third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
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: [ [ 4.  10.  16.5 25.  25.5 4.5  3.5  3.   4.5 1.5  2.5  3. ]
125        second level: [ 3.  5.  0.  2.  3.  1.  0.  4.  9. 11. 15.  8.]
126        third level:  [5. 2. 3. 7. 2. 5. 4. 2. 3. 2. 5. 4.] ]
127     Objective function values and some other indicators:
128        Obj0 = 16.00          Obj1 = 162.00          Obj0 + Obj1 = 178.00
129        Total movement of crane: 70.00
130        Total waiting time in berth position: 61.00
131        Total index of q during berthing: 390.00
132        Specific arrangement for each vessel:
```

133	V_id: 0	li: 8.0	xi: 4.0	bow of i: 0.0	tail of i: 8.0	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		
134	V_id: 1	li: 4.0	xi: 10.0	bow of i: 8.0	tail of i: 12.0	gama_i0: 5.0	gama_i1: 9.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
135	V_id: 2	li: 9.0	xi: 16.5	bow of i: 12.0	tail of i: 21.0	gama_i0: 0.0	gama_i1: 2.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
136	V_id: 3	li: 8.0	xi: 25.0	bow of i: 21.0	tail of i: 29.0	gama_i0: 2.0	gama_i1: 3.0
		duration_time_i: 1.0	demand_i: 140.0	work load_i: 140.0	work load gap_i: 0		
137	V_id: 4	li: 9.0	xi: 25.5	bow of i: 21.0	tail of i: 30.0	gama_i0: 3.0	gama_i1: 5.0
		duration_time_i: 2.0	demand_i: 60.0	work load_i: 60.0	work load gap_i: 0		
138	V_id: 5	li: 9.0	xi: 4.5	bow of i: 0.0	tail of i: 9.0	gama_i0: 1.0	gama_i1: 3.0
		duration_time_i: 2.0	demand_i: 140.0	work load_i: 140.0	work load gap_i: 0		
139	V_id: 6	li: 7.0	xi: 3.5	bow of i: 0.0	tail of i: 7.0	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		
140	V_id: 7	li: 6.0	xi: 3.0	bow of i: 0.0	tail of i: 6.0	gama_i0: 4.0	gama_i1: 8.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
141	V_id: 8	li: 9.0	xi: 4.5	bow of i: 0.0	tail of i: 9.0	gama_i0: 9.0	gama_i1: 11.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
142	V_id: 9	li: 3.0	xi: 1.5	bow of i: 0.0	tail of i: 3.0	gama_i0: 11.0	gama_i1: 15.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
143	V_id: 10	li: 5.0	xi: 2.5	bow of i: 0.0	tail of i: 5.0	gama_i0: 15.0	gama_i1: 17.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
144	V_id: 11	li: 6.0	xi: 3.0	bow of i: 0.0	tail of i: 6.0	gama_i0: 8.0	gama_i1: 9.0
		duration_time_i: 1.0	demand_i: 80.0	work load_i: 80.0	work load gap_i: 0		

```
145
146  Algorithm finished and the total CPU time: 1243 s
147  End
148
```