```
 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=1378
 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 = 18
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 = 0.95
27          Mutation rate = 0.75
28          Mu_oper_type = 1
29          vessel_move_way = 2
30          coefficient for Obj1= 0.5
31          coefficient for Obj2= 1.5
32          gen = 0
33
34  Iteration begin:
35  Beging the No. 0  iteration:
36      obj[0] = 7.66    temp_best_value_gen = 7.66
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 7.66     temp_best_value_gen = 7.66
41      No, maintain solution  and obj[gen] = 7.66 , and the tolerance_counter = 1
42      solution chromosome =
43          first level: [ [2.05 5.01]
44          second level:  [2. 1.]
45          third level:  [2. 6.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 7.66     temp_best_value_gen = 7.66
50      No, maintain solution  and obj[gen] = 7.66 , and the tolerance_counter = 2
51      solution chromosome =
52          first level: [ [2.05 5.01]
53          second level:  [2. 1.]
54          third level:  [2. 6.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 7.66     temp_best_value_gen = 3.00
59      Yes, update solution and obj[gen] = 3.00
60      solution chromosome =
61          first level: [ [2. 8.]
62          second level:  [0. 1.]
63          third level:  [2. 8.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 3.00     temp_best_value_gen = 3.00
68      No, maintain solution  and obj[gen] = 3.00 , and the tolerance_counter = 1
69      solution chromosome =
70          first level: [ [2. 8.]
71          second level:  [0. 1.]
72          third level:  [2. 8.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 3.00     temp_best_value_gen = 2.50
77      Yes, update solution and obj[gen] = 2.50
78      solution chromosome =
79          first level: [ [2. 8.]
```

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 80      second level:  [0. 1.]
 81      third level:  [3. 8.] ]
 82    The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
 86    No, maintain solution  and obj[gen] = 2.50 , and the tolerance_counter = 1
 87    solution chromosome =
 88      first level: [ [2. 8.]
 89      second level:  [0. 1.]
 90      third level:  [3. 8.] ]
 91    The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
 95    No, maintain solution  and obj[gen] = 2.50 , and the tolerance_counter = 2
 96    solution chromosome =
 97      first level: [ [2. 8.]
 98      second level:  [0. 1.]
 99      third level:  [3. 8.] ]
100    The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103    obj[gen-1] = 2.50    temp_best_value_gen = 1.50
104    Yes, update solution and obj[gen] = 1.50
105    solution chromosome =
106      first level: [ [2. 8.]
107      second level:  [0. 0.]
108      third level:  [2. 2.] ]
109    The No. 8  iteration is finished!
110
111  Beging the No. 9  iteration:
112    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
113    No, maintain solution  and obj[gen] = 1.50 , and the tolerance_counter = 1
114    solution chromosome =
115      first level: [ [2. 8.]
116      second level:  [0. 0.]
117      third level:  [2. 2.] ]
118    The No. 9  iteration is finished!
119
120  Beging the No. 10  iteration:
121    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
122    No, maintain solution  and obj[gen] = 1.50 , and the tolerance_counter = 2
123    solution chromosome =
124      first level: [ [2. 8.]
125      second level:  [0. 0.]
126      third level:  [2. 2.] ]
127    The No. 10  iteration is finished!
128
129  Beging the No. 11  iteration:
130    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
131    No, maintain solution  and obj[gen] = 1.50 , and the tolerance_counter = 3
132    solution chromosome =
133      first level: [ [2. 8.]
134      second level:  [0. 0.]
135      third level:  [2. 2.] ]
136    The No. 11  iteration is finished!
137
138  Beging the No. 12  iteration:
139    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
140    No, maintain solution  and obj[gen] = 1.50 , and the tolerance_counter = 4
141    solution chromosome =
142      first level: [ [2. 8.]
143      second level:  [0. 0.]
144      third level:  [2. 2.] ]
145    The No. 12  iteration is finished!
146
147  Beging the No. 13  iteration:
148    obj[gen-1] = 1.50    temp_best_value_gen = 1.50
149    No, maintain solution  and obj[gen] = 1.50 , and the tolerance_counter = 5
150    solution chromosome =
151      first level: [ [2. 8.]
152      second level:  [0. 0.]
153      third level:  [2. 2.] ]
154    The No. 13  iteration is finished!
155
156
157  ---------------------------------------------------------------------------
158  The iteration is terminated and then visulize the solution:
159    solution chromosome =
160      first level: [ [2. 8.]
161      second level:  [0. 0.]
162      third level:  [2. 2.] ]
163    Objective function values and some other indicators:
```

164	Obj0 = 3.00 Obj1 = 0.00 Obj0 + Obj1 = 3.00
165	Total movement of crane: 0.00
166	Total waiting time in berth position: 0.00
167	Total index of q during berthing: 31.00
168	Specific arrangement for each vessel:
169	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: 4.0
	duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
170	V_id: 1 li: 8.0 xi: 8.0 bow of i: 4.0 tail of i: 12.0 gama_i0: 0.0 gama_i1: 3.0
	duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
171	
172	Algorithm finished and the total CPU time: 396 s
173	End
174	