```
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=29168
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_10_3 _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 =  30
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] = 31.70      temp_best_value_gen = 31.70
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 31.70   temp_best_value_gen = 31.70
41      No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 1
42      solution chromosome =
43          first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
44          second level:  [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
45          third level:  [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 31.70   temp_best_value_gen = 31.70
50      No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 2
51      solution chromosome =
52          first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
53          second level:  [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
54          third level:  [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 31.70   temp_best_value_gen = 31.70
59      No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 3
60      solution chromosome =
61          first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
62          second level:  [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
63          third level:  [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 31.70   temp_best_value_gen = 31.70
68      No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 4
69      solution chromosome =
70          first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
71          second level:  [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
72          third level:  [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 31.70   temp_best_value_gen = 31.70
77      No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 5
78      solution chromosome =
79          first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
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 80      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
 81      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
 82    The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85    obj[gen-1] = 31.70   temp_best_value_gen = 31.70
 86    No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 6
 87    solution chromosome =
 88      first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
 89      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
 90      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
 91    The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94    obj[gen-1] = 31.70   temp_best_value_gen = 31.70
 95    No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 7
 96    solution chromosome =
 97      first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
 98      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
 99      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
100    The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103    obj[gen-1] = 31.70   temp_best_value_gen = 31.70
104    No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 8
105    solution chromosome =
106      first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
107      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
108      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
109    The No. 8  iteration is finished!
110
111  Beging the No. 9  iteration:
112    obj[gen-1] = 31.70   temp_best_value_gen = 31.70
113    No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 9
114    solution chromosome =
115      first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
116      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
117      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
118    The No. 9  iteration is finished!
119
120  Beging the No. 10  iteration:
121    obj[gen-1] = 31.70   temp_best_value_gen = 31.70
122    No, maintain solution  and obj[gen] = 31.70 , and the tolerance_counter = 10
123    solution chromosome =
124      first level: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
125      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
126      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
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: [ [ 4.5 10.5 14.5 19.  22.5 26.5 2.   4.   1.5  4.5]
134      second level: [ 4.  0.  5.  2.  3.  6.  8.  1. 12.  2.]
135      third level: [2. 2. 3. 2. 1. 2. 2. 5. 2. 5.] ]
136    Objective function values and some other indicators:
137    Obj0 = 14.00          Obj1 = 51.00          Obj0 + Obj1 = 65.00
138    Total movement of crane: 8.00
139    Total waiting time in berth position: 43.00
140    Total index of q during berthing: 513.00
141    Specific arrangement for each vessel:
142    V_id: 0          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 4.0          gama_i1: 6.0
                         duration_time_i: 2.0          demand_i: 80.0          work load i: 80.0          work load gap_i: 0
143    V_id: 1          li: 3.0          xi: 10.5          bow of i: 9.0          tail of i: 12.0          gama_i0: 0.0          gama_i1: 4
       .0                 duration_time_i: 4.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
144    V_id: 2          li: 5.0          xi: 14.5          bow of i: 12.0          tail of i: 17.0          gama_i0: 5.0          gama_i1: 8
       .0                 duration_time_i: 3.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
145    V_id: 3          li: 4.0          xi: 19.0          bow of i: 17.0          tail of i: 21.0          gama_i0: 2.0          gama_i1: 6
       .0                 duration_time_i: 4.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
146    V_id: 4          li: 3.0          xi: 22.5          bow of i: 21.0          tail of i: 24.0          gama_i0: 3.0          gama_i1: 6
       .0                 duration_time_i: 3.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
147    V_id: 5          li: 7.0          xi: 26.5          bow of i: 23.0          tail of i: 30.0          gama_i0: 6.0          gama_i1: 9
       .0                 duration_time_i: 3.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
148    V_id: 6          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 8.0          gama_i1: 12.0
                         duration_time_i: 4.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
149    V_id: 7          li: 8.0          xi: 4.0          bow of i: 0.0          tail of i: 8.0          gama_i0: 1.0          gama_i1: 2.0
                         duration_time_i: 1.0          demand_i: 80.0          work load_i: 80.0          work load gap_i: 0
150    V_id: 8          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 12.0          gama_i1: 15.0
                         duration_time_i: 3.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
151    V_id: 9          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 2.0          gama_i1: 3.0
                         duration_time_i: 1.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
152
153  Algorithm finished and the total CPU time: 1155 s
```

154   End
155