```
1  "E:\1 口口口口\3 口口口口\1 口口口口口\1 口口口口口口口\1_口口口口口_口口口\1_LW_口口口口2\6 口口口口\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=39014
2
3  import sys; print('Python %s on %s' % (sys.version, sys.platform))
4  sys.path.extend(['E:\\1 口口口\\3 口口口口\\1 口口口口口\\1 口口口口口口口\\1_口口口口口_口口口\\1_LW_口口口口2\\6 口口口口\\2 python code\\
   01_My_Python_Code', 'E:/1 口口口口/3 口口口口/1 口口口口口/1 口口口口口口口/1_口口口口口_口口口/1_LW_口口口口2/6 口口口口/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 口口口/3 口口口口/1 口口口口口/1 口口口口口口口/1_口口口口口_口口口/1_LW_口口口口2/6 口口口口/2 python code/01_My_Python_Code/
   main_BACASP_official_ENSGA-II.py', wdir='E:/1 口口口口/3 口口口口/1 口口口口口/1 口口口口口口口/1_口口口口口_口口口/1_LW_口口口口2/6 口口口口/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_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 =  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] = 56.90      temp_best_value_gen = 56.90
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 56.90   temp_best_value_gen = 56.90
41      No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 1
42      solution chromosome =
43          first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
44          second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
45          third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 56.90   temp_best_value_gen = 56.90
50      No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 2
51      solution chromosome =
52          first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
53          second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
54          third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 56.90   temp_best_value_gen = 56.90
59      No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 3
60      solution chromosome =
61          first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
62          second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
63          third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 56.90   temp_best_value_gen = 56.90
68      No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 4
69      solution chromosome =
70          first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
71          second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
72          third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 56.90   temp_best_value_gen = 56.90
77      No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 5
78      solution chromosome =
79          first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
```

80   second level: [2. 21. 2. 6. 1. 4. 10. 13. 1. 17. 6. 4.]
81   third level: [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.]]
82   The No. 5 iteration is finished!
83
84   Beging the No. 6 iteration:
85   obj[gen-1] = 56.90   temp_best_value_gen = 56.90
86   No, maintain solution and obj[gen] = 56.90 , and the tolerance_counter = 6
87   solution chromosome =
88   first level: [[2.   4.5 14.5 18. 23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
89   second level: [2. 21. 2. 6. 1. 4. 10. 13. 1. 17. 6. 4.]
90   third level: [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.]]
91   The No. 6 iteration is finished!
92
93   Beging the No. 7 iteration:
94   obj[gen-1] = 56.90   temp_best_value_gen = 56.90
95   No, maintain solution and obj[gen] = 56.90 , and the tolerance_counter = 7
96   solution chromosome =
97   first level: [[2.   4.5 14.5 18. 23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
98   second level: [2. 21. 2. 6. 1. 4. 10. 13. 1. 17. 6. 4.]
99   third level: [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.]]
100   The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103   obj[gen-1] = 56.90   temp_best_value_gen = 56.90
104   No, maintain solution and obj[gen] = 56.90 , and the tolerance_counter = 8
105   solution chromosome =
106   first level: [[2.   4.5 14.5 18. 23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
107   second level: [2. 21. 2. 6. 1. 4. 10. 13. 1. 17. 6. 4.]
108   third level: [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.]]
109   The No. 8 iteration is finished!
110
111
112 --
113 The iteration is terminated and then visulize the solution:
114   solution chromosome =
115   first level: [[2.   4.5 14.5 18. 23.5 26.   4.5 4.   3.5 4.   8.5 3.5]
116   second level: [2. 21. 2. 6. 1. 4. 10. 13. 1. 17. 6. 4.]
117   third level: [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.]]
118   Objective function values and some other indicators:
119   Obj0 = 24.00   Obj1 = 113.00   Obj0 + Obj1 = 137.00
120   Total movement of crane: 12.00
121   Total waiting time in berth position: 87.00
122   Total index of q during berthing: 547.00
123   Specific arrangement for each vessel:
124   V_id: 0   li: 4.0   xi: 2.0   bow of i: 0.0   tail of i: 4.0   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
125   V_id: 1   li: 9.0   xi: 4.5   bow of i: 0.0   tail of i: 9.0   gama_i0: 21.0   gama_i1: 25.0
                duration_time_i: 4.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0
126   V_id: 2   li: 3.0   xi: 14.5   bow of i: 13.0   tail of i: 16.0   gama_i0: 2.0   gama_i1: 5
         .0   duration_time_i: 3.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0
127   V_id: 3   li: 4.0   xi: 18.0   bow of i: 16.0   tail of i: 20.0   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
128   V_id: 4   li: 7.0   xi: 23.5   bow of i: 20.0   tail of i: 27.0   gama_i0: 1.0   gama_i1: 4
         .0   duration_time_i: 3.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0
129   V_id: 5   li: 8.0   xi: 26.0   bow of i: 22.0   tail of i: 30.0   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
130   V_id: 6   li: 9.0   xi: 4.5   bow of i: 0.0   tail of i: 9.0   gama_i0: 10.0   gama_i1: 13.0
                duration_time_i: 3.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0
131   V_id: 7   li: 8.0   xi: 4.0   bow of i: 0.0   tail of i: 8.0   gama_i0: 13.0   gama_i1: 17.0
                duration_time_i: 4.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0
132   V_id: 8   li: 7.0   xi: 3.5   bow of i: 0.0   tail of i: 7.0   gama_i0: 1.0   gama_i1: 2.0
                duration_time_i: 1.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0
133   V_id: 9   li: 8.0   xi: 4.0   bow of i: 0.0   tail of i: 8.0   gama_i0: 17.0   gama_i1: 21.0
                duration_time_i: 4.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0
134   V_id: 10   li: 5.0   xi: 8.5   bow of i: 6.0   tail of i: 11.0   gama_i0: 6.0   gama_i1:
         10.0   duration_time_i: 4.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0
135   V_id: 11   li: 7.0   xi: 3.5   bow of i: 0.0   tail of i: 7.0   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
136
137 Algorithm finished and the total CPU time: 1206 s
138 End
139