```
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=6521

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_19_7 _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 =  57
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] = 88.00     temp_best_value_gen = 88.00
37     The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40     obj[gen-1] = 88.00   temp_best_value_gen = 88.00
41     No, maintain solution  and obj[gen] = 88.00 , and the tolerance_counter = 1
42     solution chromosome =
43        first level: [ [ 2.5  7.  13.  21.   1.5 27.   2.   3.5 2.  26.5 1.5 3.   2.   1.5
44     4.   3.   3.   2.5  4. ]
45        second level:  [ 2.   3.   4.   5. 14.   8.   4.   8. 11.   0. 17.   1. 20. 23. 26. 28.   0. 30.
46     33.]
47        third level:  [4. 2. 2. 2. 3. 2. 2. 2. 2. 2. 3. 6. 3. 2. 4. 5. 3. 2. 3.] ]
48     The No. 1  iteration is finished!
49
50  Beging the No. 2  iteration:
51     obj[gen-1] = 88.00   temp_best_value_gen = 88.00
52     No, maintain solution  and obj[gen] = 88.00 , and the tolerance_counter = 2
53     solution chromosome =
54        first level: [ [ 2.5  7.  13.  21.   1.5 27.   2.   3.5 2.  26.5 1.5 3.   2.   1.5
55     4.   3.   3.   2.5  4. ]
56        second level:  [ 2.   3.   4.   5. 14.   8.   4.   8. 11.   0. 17.   1. 20. 23. 26. 28.   0. 30.
57     33.]
58        third level:  [4. 2. 2. 2. 3. 2. 2. 2. 2. 2. 3. 6. 3. 2. 4. 5. 3. 2. 3.] ]
59     The No. 2  iteration is finished!
60
61  Beging the No. 3  iteration:
62     obj[gen-1] = 88.00   temp_best_value_gen = 88.00
63     No, maintain solution  and obj[gen] = 88.00 , and the tolerance_counter = 3
64     solution chromosome =
65        first level: [ [ 2.5  7.  13.  21.   1.5 27.   2.   3.5 2.  26.5 1.5 3.   2.   1.5
66     4.   3.   3.   2.5  4. ]
67        second level:  [ 2.   3.   4.   5. 14.   8.   4.   8. 11.   0. 17.   1. 20. 23. 26. 28.   0. 30.
68     33.]
69        third level:  [4. 2. 2. 2. 3. 2. 2. 2. 2. 2. 3. 6. 3. 2. 4. 5. 3. 2. 3.] ]
70     The No. 3  iteration is finished!
71
72
73  ----------------------------------------------------------------------------------------
74  The iteration is terminated and then visulize the solution:
75     solution chromosome =
76        first level: [ [ 2.5  7.  13.  21.   1.5 27.   2.   3.5 2.  26.5 1.5 3.   2.   1.5
77     4.   3.   3.   2.5  4. ]
78        second level:  [ 2.   3.   4.   5. 14.   8.   4.   8. 11.   0. 17.   1. 20. 23. 26. 28.   0. 30.
79     33.]
```

80   third level: [4. 2. 2. 2. 3. 2. 2. 2. 2. 3. 6. 3. 2. 4. 5. 3. 2. 3.]]

81   Objective function values and some other indicators:

82   Obj0 = 33.00   Obj1 = 253.00   Obj0 + Obj1 = 286.00

83   Total movement of crane: 16.00

84   Total waiting time in berth position: 237.00

85   Total index of q during berthing: 509.00

86   Specific arrangement for each vessel:

87   V_id: 0   li: 5.0   xi: 2.5   bow of i: 0.0   tail of i: 5.0   gama_i0: 2.0   gama_i1: 4.0
             duration_time_i: 2.0   demand_i: 120.0   work load_i: 120.0   work load gap_i: 0

88   V_id: 1   li: 4.0   xi: 7.0   bow of i: 5.0   tail of i: 9.0   gama_i0: 3.0   gama_i1: 7.0
             duration_time_i: 4.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0

89   V_id: 2   li: 8.0   xi: 13.0   bow of i: 9.0   tail of i: 17.0   gama_i0: 4.0   gama_i1: 8
.0   duration_time_i: 4.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0

90   V_id: 3   li: 8.0   xi: 21.0   bow of i: 17.0   tail of i: 25.0   gama_i0: 5.0   gama_i1: 8
.0   duration_time_i: 3.0   demand_i: 120.0   work load_i: 120.0   work load gap_i: 0

91   V_id: 4   li: 3.0   xi: 1.5   bow of i: 0.0   tail of i: 3.0   gama_i0: 14.0   gama_i1: 17.0
             duration_time_i: 3.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0

92   V_id: 5   li: 6.0   xi: 27.0   bow of i: 24.0   tail of i: 30.0   gama_i0: 8.0   gama_i1:
11.0   duration_time_i: 3.0   demand_i: 120.0   work load_i: 120.0   work load gap_i: 0

93   V_id: 6   li: 4.0   xi: 2.0   bow of i: 0.0   tail of i: 4.0   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

94   V_id: 7   li: 7.0   xi: 3.5   bow of i: 0.0   tail of i: 7.0   gama_i0: 8.0   gama_i1: 11.0
             duration_time_i: 3.0   demand_i: 120.0   work load_i: 120.0   work load gap_i: 0

95   V_id: 8   li: 4.0   xi: 2.0   bow of i: 0.0   tail of i: 4.0   gama_i0: 11.0   gama_i1: 14.0
             duration_time_i: 3.0   demand_i: 120.0   work load_i: 120.0   work load gap_i: 0

96   V_id: 9   li: 3.0   xi: 26.5   bow of i: 25.0   tail of i: 28.0   gama_i0: 0.0   gama_i1: 2
.0   duration_time_i: 2.0   demand_i: 80.0   work load_i: 80.0   work load gap_i: 0

97   V_id: 10   li: 3.0   xi: 1.5   bow of i: 0.0   tail of i: 3.0   gama_i0: 17.0   gama_i1: 20.
0   duration_time_i: 3.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0

98   V_id: 11   li: 6.0   xi: 3.0   bow of i: 0.0   tail of i: 6.0   gama_i0: 1.0   gama_i1: 2.0
             duration_time_i: 1.0   demand_i: 100.0   work load_i: 100.0   work load gap_i: 0

99   V_id: 12   li: 4.0   xi: 2.0   bow of i: 0.0   tail of i: 4.0   gama_i0: 20.0   gama_i1: 23.
0   duration_time_i: 3.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0

100   V_id: 13   li: 3.0   xi: 1.5   bow of i: 0.0   tail of i: 3.0   gama_i0: 23.0   gama_i1: 26.
0   duration_time_i: 3.0   demand_i: 100.0   work load_i: 100.0   work load gap_i: 0

101   V_id: 14   li: 8.0   xi: 4.0   bow of i: 0.0   tail of i: 8.0   gama_i0: 26.0   gama_i1: 28.
0   duration_time_i: 2.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0

102   V_id: 15   li: 6.0   xi: 3.0   bow of i: 0.0   tail of i: 6.0   gama_i0: 28.0   gama_i1: 30.
0   duration_time_i: 2.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0

103   V_id: 16   li: 6.0   xi: 3.0   bow of i: 0.0   tail of i: 6.0   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

104   V_id: 17   li: 5.0   xi: 2.5   bow of i: 0.0   tail of i: 5.0   gama_i0: 30.0   gama_i1: 33.
0   duration_time_i: 3.0   demand_i: 100.0   work load_i: 100.0   work load gap_i: 0

105   V_id: 18   li: 8.0   xi: 4.0   bow of i: 0.0   tail of i: 8.0   gama_i0: 33.0   gama_i1: 34.
0   duration_time_i: 1.0   demand_i: 60.0   work load_i: 60.0   work load gap_i: 0

106

107 Algorithm finished and the total CPU time: 1765 s

108 End

109