

```

1 "E:\1 \ \ \ \ \3 \ \ \ \ \ \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=13082
2
3 import sys; print('Python %s on %s' % (sys.version, sys.platform))
4 sys.path.extend(['E:\1 \ \ \ \ \3 \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1 \ \ \ \ \ \ \ \ \ \ \ \1_LW_ \ \ \ \ \2\6 \ \ \ \ \2 python code\
   01_My_Python_Code', 'E:/1 \ \ \ \ \3 \ \ \ \ \ \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_LW_ \ \ \ \ \2\6 \ \ \ \ \2 python code\01_My_Python_Code/
   main_BACASP_official_ENSGA-II.py', wdir='E:/1 \ \ \ \ \3 \ \ \ \ \ \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 = 35
21     Pop_size = 20
22     Tolerance_iteration_unchanged_number = 10
23     Chrom_size = 6
24     Iter_num_GA = 300
25     Select_rate = 0.9
26     Crossover_rate = 0.8
27     Mutation_rate = 0.8
28     Mu_oper_type = 2
29     vessel_move_way = 1
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] = 6.50   temp_best_value_gen = 6.50
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 6.50   temp_best_value_gen = 6.50
41   No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 1
42   solution chromosome =
43     first level: [ [2. 8.]
44     second level: [3. 0.]
45     third level: [4. 6.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 6.50   temp_best_value_gen = 6.50
50   No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 2
51   solution chromosome =
52     first level: [ [2. 8.]
53     second level: [3. 0.]
54     third level: [4. 6.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 6.50   temp_best_value_gen = 6.50
59   No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 3
60   solution chromosome =
61     first level: [ [2. 8.]
62     second level: [3. 0.]
63     third level: [4. 6.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 6.50   temp_best_value_gen = 6.50
68   No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 4
69   solution chromosome =
70     first level: [ [2. 8.]
71     second level: [3. 0.]
72     third level: [4. 6.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 6.50   temp_best_value_gen = 6.50
77   No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 5
78   solution chromosome =
79     first level: [ [2. 8.]

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80     second level: [3. 0.]
81     third level: [4. 6.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 6.50     temp_best_value_gen = 6.50
86     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 6
87     solution chromosome =
88         first level: [ [2. 8.]
89         second level: [3. 0.]
90         third level: [4. 6.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 6.50     temp_best_value_gen = 6.50
95     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 7
96     solution chromosome =
97         first level: [ [2. 8.]
98         second level: [3. 0.]
99         third level: [4. 6.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 6.50     temp_best_value_gen = 6.50
104     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 8
105     solution chromosome =
106         first level: [ [2. 8.]
107         second level: [3. 0.]
108         third level: [4. 6.] ]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 6.50     temp_best_value_gen = 6.50
113     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 9
114     solution chromosome =
115         first level: [ [2. 8.]
116         second level: [3. 0.]
117         third level: [4. 6.] ]
118    The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 6.50     temp_best_value_gen = 6.50
122     No, maintain solution and obj[gen] = 6.50 , and the tolerance_counter = 10
123     solution chromosome =
124         first level: [ [2. 8.]
125         second level: [3. 0.]
126         third level: [4. 6.] ]
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: [ [2. 8.]
134         second level: [3. 0.]
135         third level: [4. 6.] ]
136 Objective function values and some other indicators:
137     Obj0 = 4.00           Obj1 = 3.00           Obj0 + Obj1 = 7.00
138     Total movement of crane: 0.00
139     Total waiting time in berth position: 3.00
140     Total index of q during berthing: 51.00
141     Specific arrangement for each vessel:
142     V_id: 0              li: 4.0              xi: 2.0              bow of i: 0.0              tail of i: 4.0              gama_i0: 3.0              gama_i1: 5.0
143         duration_time_i: 2.0              demand_i: 160.0              work load_i: 160.0              work load gap_i: 0
144     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: 1.0
145         duration_time_i: 1.0              demand_i: 120.0              work load_i: 120.0              work load gap_i: 0
146
147 Algorithm finished and the total CPU time: 173 s
148 End
149

```