

```

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=1425
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 = 37
21     Pop_size = 30
22     Tolerance_iteration_unchanged_number = 8
23     Chrom_size = 6
24     Iter_num_GA = 300
25     Select_rate = 0.8
26     Crossover_rate = 0.8
27     Mutation_rate = 0.8
28     Mu_oper_type = 1
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] = 11.00   temp_best_value_gen = 11.00
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 11.00   temp_best_value_gen = 11.00
41   No, maintain solution and obj[gen] = 11.00 , and the tolerance_counter = 1
42   solution chromosome =
43     first level: [ [2. 8.]
44     second level: [5. 0.]
45     third level: [3. 6.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 11.00   temp_best_value_gen = 9.50
50   Yes, update solution and obj[gen] = 9.50
51   solution chromosome =
52     first level: [ [2. 8.]
53     second level: [4. 0.]
54     third level: [2. 6.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 9.50   temp_best_value_gen = 4.50
59   Yes, update solution and obj[gen] = 4.50
60   solution chromosome =
61     first level: [ [8. 4.]
62     second level: [0. 2.]
63     third level: [4. 3.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 4.50   temp_best_value_gen = 2.50
68   Yes, update solution and obj[gen] = 2.50
69   solution chromosome =
70     first level: [ [2. 8.]
71     second level: [1. 0.]
72     third level: [4. 6.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 2.50   temp_best_value_gen = 2.50
77   No, maintain solution and obj[gen] = 2.50 , and the tolerance_counter = 1
78   solution chromosome =
79     first level: [ [2. 8.]

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80     second level: [1. 0.]
81     third level: [4. 6.] ]
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 = 2
87     solution chromosome =
88     first level: [ [2. 8.]
89     second level: [1. 0.]
90     third level: [4. 6.] ]
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 = 3
96     solution chromosome =
97     first level: [ [2. 8.]
98     second level: [1. 0.]
99     third level: [4. 6.] ]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
104    No, maintain solution and obj[gen] = 2.50 , and the tolerance_counter = 4
105    solution chromosome =
106    first level: [ [2. 8.]
107    second level: [1. 0.]
108    third level: [4. 6.] ]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
113    No, maintain solution and obj[gen] = 2.50 , and the tolerance_counter = 5
114    solution chromosome =
115    first level: [ [2. 8.]
116    second level: [1. 0.]
117    third level: [4. 6.] ]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
122    No, maintain solution and obj[gen] = 2.50 , and the tolerance_counter = 6
123    solution chromosome =
124    first level: [ [2. 8.]
125    second level: [1. 0.]
126    third level: [4. 6.] ]
127    The No. 10 iteration is finished!
128
129    Beging the No. 11 iteration:
130    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
131    No, maintain solution and obj[gen] = 2.50 , and the tolerance_counter = 7
132    solution chromosome =
133    first level: [ [2. 8.]
134    second level: [1. 0.]
135    third level: [4. 6.] ]
136    The No. 11 iteration is finished!
137
138    Beging the No. 12 iteration:
139    obj[gen-1] = 2.50    temp_best_value_gen = 2.50
140    No, maintain solution and obj[gen] = 2.50 , and the tolerance_counter = 8
141    solution chromosome =
142    first level: [ [2. 8.]
143    second level: [1. 0.]
144    third level: [4. 6.] ]
145    The No. 12 iteration is finished!
146
147
148    -----
149    The iteration is terminated and then visulize the solution:
150    solution chromosome =
151    first level: [ [2. 8.]
152    second level: [1. 0.]
153    third level: [4. 6.] ]
154    Objective function values and some other indicators:
155    Obj0 = 2.00      Obj1 = 1.00      Obj0 + Obj1 = 3.00
156    Total movement of crane: 0.00
157    Total waiting time in berth position: 1.00
158    Total index of q during berthing: 51.00
159    Specific arrangement for each vessel:
160    V_id: 0          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 1.0          gama_i1: 3.0
161    duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
162    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
163    duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0

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162
163 Algorithm finished and the total CPU time: 331 s
164 End
165
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