

```

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=37167
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_11_4_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 = 33
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] = 35.00   temp_best_value_gen = 35.00
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 35.00   temp_best_value_gen = 35.00
41   No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 1
42   solution chromosome =
43     first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
44     second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
45     third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 35.00   temp_best_value_gen = 35.00
50   No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 2
51   solution chromosome =
52     first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
53     second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
54     third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 35.00   temp_best_value_gen = 35.00
59   No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 3
60   solution chromosome =
61     first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
62     second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
63     third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 35.00   temp_best_value_gen = 35.00
68   No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 4
69   solution chromosome =
70     first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
71     second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
72     third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 35.00   temp_best_value_gen = 35.00
77   No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 5
78   solution chromosome =
79     first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]

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80     second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
81     third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 35.00   temp_best_value_gen = 35.00
86     No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 6
87     solution chromosome =
88         first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
89         second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
90         third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 35.00   temp_best_value_gen = 35.00
95     No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 7
96     solution chromosome =
97         first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
98         second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
99         third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 35.00   temp_best_value_gen = 35.00
104     No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 8
105     solution chromosome =
106         first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
107         second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
108         third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 35.00   temp_best_value_gen = 35.00
113     No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 9
114     solution chromosome =
115         first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
116         second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
117         third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
118    The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121     obj[gen-1] = 35.00   temp_best_value_gen = 35.00
122     No, maintain solution and obj[gen] = 35.00 , and the tolerance_counter = 10
123     solution chromosome =
124         first level: [ [ 2. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
125         second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
126         third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
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. 8.5 17. 25. 26. 3.5 3. 4.5 2. 1.5 2. ]
134         second level: [ 1. 0. 5. 4. 1. 5. 3. 8. 10. 11. 12.]
135         third level: [4. 2. 3. 3. 3. 2. 4. 3. 4. 3. 3.] ]
136 Objective function values and some other indicators:
137     Obj0 = 14.00      Obj1 = 84.00      Obj0 + Obj1 = 98.00
138     Total movement of crane: 12.00
139     Total waiting time in berth position: 60.00
140     Total index of q during berthing: 420.00
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: 1.0          gama_i1: 3.0
143         duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
144     V_id: 1          li: 9.0          xi: 8.5          bow of i: 4.0          tail of i: 13.0          gama_i0: 0.0          gama_i1: 3.0
145         duration_time_i: 3.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
146     V_id: 2          li: 8.0          xi: 17.0          bow of i: 13.0          tail of i: 21.0          gama_i0: 5.0          gama_i1: 7
147         duration_time_i: 2.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
148     V_id: 3          li: 8.0          xi: 25.0          bow of i: 21.0          tail of i: 29.0          gama_i0: 4.0          gama_i1: 6
149         duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
150     V_id: 4          li: 8.0          xi: 26.0          bow of i: 22.0          tail of i: 30.0          gama_i0: 1.0          gama_i1: 4
151         duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
152     V_id: 5          li: 7.0          xi: 3.5          bow of i: 0.0          tail of i: 7.0          gama_i0: 5.0          gama_i1: 8.0
153         duration_time_i: 3.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
154     V_id: 6          li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 3.0          gama_i1: 5.0
155         duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
156     V_id: 7          li: 9.0          xi: 4.5          bow of i: 0.0          tail of i: 9.0          gama_i0: 8.0          gama_i1: 10.0
157         duration_time_i: 2.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
158     V_id: 8          li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 10.0          gama_i1: 11.0
159         duration time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
160     V_id: 9          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 11.0          gama_i1: 12.0
161         duration_time_i: 1.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
162     V_id: 10         li: 4.0          xi: 2.0          bow of i: 0.0          tail of i: 4.0          gama_i0: 12.0          gama_i1: 15.
163         duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0

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unknown

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153
154 Algorithm finished and the total CPU time: 1283 s
155 End
156
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