

```

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=41367
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_13_3 _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 = 39
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] = 42.60   temp_best_value_gen = 42.60
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 42.60   temp_best_value_gen = 42.60
41   No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 1
42   solution chromosome =
43     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
44     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
45     third level: [ 5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 42.60   temp_best_value_gen = 42.60
50   No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 2
51   solution chromosome =
52     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
53     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
54     third level: [ 5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 42.60   temp_best_value_gen = 42.60
59   No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 3
60   solution chromosome =
61     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
62     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
63     third level: [ 5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 42.60   temp_best_value_gen = 42.60
68   No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 4
69   solution chromosome =
70     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
71     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
72     third level: [ 5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 42.60   temp_best_value_gen = 42.60
77   No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 5
78   solution chromosome =
79     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]

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80     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
81     third level: [5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.]]
82     The No. 5 iteration is finished!
83
84 Beging the No. 6 iteration:
85     obj[gen-1] = 42.60   temp_best_value_gen = 42.60
86     No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
89     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
90     third level: [5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.]]
91     The No. 6 iteration is finished!
92
93 Beging the No. 7 iteration:
94     obj[gen-1] = 42.60   temp_best_value_gen = 42.60
95     No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
98     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
99     third level: [5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.]]
100    The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103     obj[gen-1] = 42.60   temp_best_value_gen = 42.60
104     No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 8
105     solution chromosome =
106     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
107     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
108     third level: [5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.]]
109    The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112     obj[gen-1] = 42.60   temp_best_value_gen = 42.60
113     No, maintain solution and obj[gen] = 42.60 , and the tolerance_counter = 9
114     solution chromosome =
115     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
116     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
117     third level: [5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.]]
118    The No. 9 iteration is finished!
119
120
121 -----
122 The iteration is terminated and then visulize the solution:
123 solution chromosome =
124     first level: [ [ 3.5 9.5 16. 24.5 25.5 2.5 4. 4. 1.5 1.5 1.5 1.5 3. ]
125     second level: [ 1. 2. 3. 7. 1. 6. 5. 4. 8. 10. 12. 14. 3.]
126     third level: [5. 5. 7. 3. 4. 4. 5. 8. 2. 3. 3. 3. 6.]]
127 Objective function values and some other indicators:
128     Obj0 = 15.00      Obj1 = 141.00      Obj0 + Obj1 = 156.00
129     Total movement of crane: 16.00
130     Total waiting time in berth position: 76.00
131     Total index of q during berthing: 532.00
132 Specific arrangement for each vessel:
133     V_id: 0          li: 7.0          xi: 3.5          bow of i: 0.0          tail of i: 7.0          gama_i0: 1.0          gama_i1: 3.0
134           duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
135     V_id: 1          li: 5.0          xi: 9.5          bow of i: 7.0          tail of i: 12.0          gama_i0: 2.0          gama_i1: 4.0
136           duration_time_i: 2.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
137     V_id: 2          li: 8.0          xi: 16.0          bow of i: 12.0          tail of i: 20.0          gama_i0: 3.0          gama_i1: 4
138           duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
139     V_id: 3          li: 9.0          xi: 24.5          bow of i: 20.0          tail of i: 29.0          gama_i0: 7.0          gama_i1:
140           duration_time_i: 3.0          demand_i: 160.0          work load_i: 160.0          work load gap_i: 0
141     V_id: 4          li: 9.0          xi: 25.5          bow of i: 21.0          tail of i: 30.0          gama_i0: 1.0          gama_i1: 3
142           duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
143     V_id: 5          li: 5.0          xi: 2.5          bow of i: 0.0          tail of i: 5.0          gama_i0: 6.0          gama_i1: 8.0
144           duration_time_i: 2.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
145     V_id: 6          li: 8.0          xi: 4.0          bow of i: 0.0          tail of i: 8.0          gama_i0: 5.0          gama_i1: 6.0
146           duration_time_i: 1.0          demand_i: 100.0          work load_i: 100.0          work load gap_i: 0
147     V_id: 7          li: 8.0          xi: 4.0          bow of i: 0.0          tail of i: 8.0          gama_i0: 4.0          gama_i1: 5.0
148           duration_time_i: 1.0          demand_i: 140.0          work load_i: 140.0          work load gap_i: 0
149     V_id: 8          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 8.0          gama_i1: 10.0
150           duration_time_i: 2.0          demand_i: 60.0          work load_i: 60.0          work load gap_i: 0
151     V_id: 9          li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 10.0          gama_i1: 12.0
152           duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
153     V_id: 10         li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 12.0          gama_i1: 14.
154           duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
155     V_id: 11         li: 3.0          xi: 1.5          bow of i: 0.0          tail of i: 3.0          gama_i0: 14.0          gama_i1: 16.
156           duration_time_i: 2.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
157     V_id: 12         li: 6.0          xi: 3.0          bow of i: 0.0          tail of i: 6.0          gama_i0: 3.0          gama_i1: 4.0
158           duration_time_i: 1.0          demand_i: 120.0          work load_i: 120.0          work load gap_i: 0
159
160 Algorithm finished and the total CPU time: 1284 s
161 End
162

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