

```

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=28654
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_9_10_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 = 27
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] = 22.60   temp_best_value_gen = 22.60
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 22.60   temp_best_value_gen = 22.60
41   No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 1
42   solution chromosome =
43     first level: [ [ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
44     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
45     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 22.60   temp_best_value_gen = 22.60
50   No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 2
51   solution chromosome =
52     first level: [ [ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
53     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
54     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 22.60   temp_best_value_gen = 22.60
59   No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 3
60   solution chromosome =
61     first level: [ [ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
62     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
63     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 22.60   temp_best_value_gen = 22.60
68   No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 4
69   solution chromosome =
70     first level: [ [ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
71     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
72     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 22.60   temp_best_value_gen = 22.60
77   No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 5
78   solution chromosome =
79     first level: [ [ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]

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80     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
81     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 22.60 temp_best_value_gen = 22.60
86     No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 6
87     solution chromosome =
88     first level: [[ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
89     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
90     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 22.60 temp_best_value_gen = 22.60
95     No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 7
96     solution chromosome =
97     first level: [[ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
98     second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
99     third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 22.60 temp_best_value_gen = 22.60
104    No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 8
105    solution chromosome =
106    first level: [[ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
107    second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
108    third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 22.60 temp_best_value_gen = 22.60
113    No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 9
114    solution chromosome =
115    first level: [[ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
116    second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
117    third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
118    The No. 9 iteration is finished!
119
120    Beging the No. 10 iteration:
121    obj[gen-1] = 22.60 temp_best_value_gen = 22.60
122    No, maintain solution and obj[gen] = 22.60 , and the tolerance_counter = 10
123    solution chromosome =
124    first level: [[ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
125    second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
126    third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
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: [[ 3. 8. 11.5 14.5 20.5 26. 4.5 4. 3. ]
134    second level: [4. 7. 4. 1. 1. 4. 0. 1. 2.]
135    third level: [2. 2. 3. 2. 3. 6. 5. 7. 2.]]
136    Objective function values and some other indicators:
137    Obj0 = 10.00 Obj1 = 36.00 Obj0 + Obj1 = 46.00
138    Total movement of crane: 12.00
139    Total waiting time in berth position: 24.00
140    Total index of q during berthing: 380.00
141    Specific arrangement for each vessel:
142    V_id: 0 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 4.0 gama_i1: 7.0
143    duration_time_i: 3.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
144    V_id: 1 li: 4.0 xi: 8.0 bow of i: 6.0 tail of i: 10.0 gama_i0: 7.0 gama_i1: 11.
145    duration_time_i: 4.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
146    V_id: 2 li: 3.0 xi: 11.5 bow of i: 10.0 tail of i: 13.0 gama_i0: 4.0 gama_i1: 6
147    duration_time_i: 2.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
148    V_id: 3 li: 3.0 xi: 14.5 bow of i: 13.0 tail of i: 16.0 gama_i0: 1.0 gama_i1: 4
149    duration_time_i: 3.0 demand_i: 100.0 work load_i: 100.0 work load gap_i: 0
150    V_id: 4 li: 9.0 xi: 20.5 bow of i: 16.0 tail of i: 25.0 gama_i0: 1.0 gama_i1: 4
151    duration_time_i: 3.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
152    V_id: 5 li: 8.0 xi: 26.0 bow of i: 22.0 tail of i: 30.0 gama_i0: 4.0 gama_i1: 5
153    duration_time_i: 1.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
154    V_id: 6 li: 9.0 xi: 4.5 bow of i: 0.0 tail of i: 9.0 gama_i0: 0.0 gama_i1: 1.0
155    duration_time_i: 1.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
156    V_id: 7 li: 8.0 xi: 4.0 bow of i: 0.0 tail of i: 8.0 gama_i0: 1.0 gama_i1: 2.0
157    duration_time_i: 1.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
158    V_id: 8 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 2.0 gama_i1: 4.0
159    duration_time_i: 2.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
160
161    Algorithm finished and the total CPU time: 1059 s
162    End
163

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