

```

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=51544
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_12_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 = 36
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] = 56.20   temp_best_value_gen = 56.20
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 56.20   temp_best_value_gen = 53.80
41   Yes, update solution and obj[gen] = 53.80
42   solution chromosome =
43     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]
44     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
45     third level: [ 3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
46   The No. 1 iteration is finished!
47
48 Beging the No. 2 iteration:
49   obj[gen-1] = 53.80   temp_best_value_gen = 53.80
50   No, maintain solution and obj[gen] = 53.80 , and the tolerance_counter = 1
51   solution chromosome =
52     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]
53     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
54     third level: [ 3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
55   The No. 2 iteration is finished!
56
57 Beging the No. 3 iteration:
58   obj[gen-1] = 53.80   temp_best_value_gen = 53.80
59   No, maintain solution and obj[gen] = 53.80 , and the tolerance_counter = 2
60   solution chromosome =
61     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]
62     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
63     third level: [ 3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
64   The No. 3 iteration is finished!
65
66 Beging the No. 4 iteration:
67   obj[gen-1] = 53.80   temp_best_value_gen = 53.80
68   No, maintain solution and obj[gen] = 53.80 , and the tolerance_counter = 3
69   solution chromosome =
70     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]
71     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
72     third level: [ 3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
73   The No. 4 iteration is finished!
74
75 Beging the No. 5 iteration:
76   obj[gen-1] = 53.80   temp_best_value_gen = 53.80
77   No, maintain solution and obj[gen] = 53.80 , and the tolerance_counter = 4
78   solution chromosome =
79     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]

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80     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
81     third level: [3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
82     The No. 5 iteration is finished!
83
84     Beging the No. 6 iteration:
85     obj[gen-1] = 53.80 temp_best_value_gen = 53.80
86     No, maintain solution and obj[gen] = 53.80 , and the tolerance_counter = 5
87     solution chromosome =
88     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]
89     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
90     third level: [3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
91     The No. 6 iteration is finished!
92
93     Beging the No. 7 iteration:
94     obj[gen-1] = 53.80 temp_best_value_gen = 53.80
95     No, maintain solution and obj[gen] = 53.80 , and the tolerance_counter = 6
96     solution chromosome =
97     first level: [ [ 2. 8. 16. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 2.5]
98     second level: [ 3. 1. 4. 3. 8. 9. 6. 1. 11. 13. 0. 17.]
99     third level: [3. 6. 2. 2. 2. 4. 2. 6. 5. 2. 7. 2.] ]
100    The No. 7 iteration is finished!
101
102    Beging the No. 8 iteration:
103    obj[gen-1] = 53.80 temp_best_value_gen = 53.70
104    Yes, update solution and obj[gen] = 53.70
105    solution chromosome =
106    first level: [ [ 2. 8. 4. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 16.]
107    second level: [ 3. 1. 17. 3. 8. 9. 6. 20. 11. 13. 0. 4.]
108    third level: [3. 6. 2. 2. 2. 4. 2. 5. 5. 2. 7. 2.] ]
109    The No. 8 iteration is finished!
110
111    Beging the No. 9 iteration:
112    obj[gen-1] = 53.70 temp_best_value_gen = 53.70
113    No, maintain solution and obj[gen] = 53.70 , and the tolerance_counter = 1
114    solution chromosome =
115    first level: [ [ 2. 8. 4. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 16.]
116    second level: [ 3. 1. 17. 3. 8. 9. 6. 20. 11. 13. 0. 4.]
117    third level: [3. 6. 2. 2. 2. 4. 2. 5. 5. 2. 7. 2.] ]
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: [ [ 2. 8. 4. 22. 27. 4.5 2.5 25.5 2.5 3. 4.5 16.]
125 second level: [ 3. 1. 17. 3. 8. 9. 6. 20. 11. 13. 0. 4.]
126 third level: [3. 6. 2. 2. 2. 4. 2. 5. 5. 2. 7. 2.] ]
127 Objective function values and some other indicators:
128 Obj0 = 21.00 Obj1 = 138.00 Obj0 + Obj1 = 159.00
129 Total movement of crane: 35.00
130 Total waiting time in berth position: 95.00
131 Total index of q during berthing: 665.00
132 Specific arrangement for each vessel:
133 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: 6.0
134 duration_time_i: 3.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
135 V_id: 1 li: 8.0 xi: 8.0 bow of i: 4.0 tail of i: 12.0 gama_i0: 1.0 gama_i1: 2.0
136 duration_time_i: 1.0 demand_i: 60.0 work load_i: 60.0 work load gap_i: 0
137 V_id: 2 li: 8.0 xi: 4.0 bow of i: 0.0 tail of i: 8.0 gama_i0: 17.0 gama_i1: 19.0
138 duration_time_i: 2.0 demand_i: 80.0 work load_i: 80.0 work load gap_i: 0
139 V_id: 3 li: 4.0 xi: 22.0 bow of i: 20.0 tail of i: 24.0 gama_i0: 3.0 gama_i1: 7
140 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
141 V_id: 4 li: 6.0 xi: 27.0 bow of i: 24.0 tail of i: 30.0 gama_i0: 8.0 gama_i1:
142 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
143 V_id: 5 li: 7.0 xi: 4.5 bow of i: 1.0 tail of i: 8.0 gama_i0: 9.0 gama_i1: 11.0
144 duration_time_i: 2.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
145 V_id: 6 li: 5.0 xi: 2.5 bow of i: 0.0 tail of i: 5.0 gama_i0: 6.0 gama_i1: 9.0
146 duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
147 V_id: 7 li: 9.0 xi: 25.5 bow of i: 21.0 tail of i: 30.0 gama_i0: 20.0 gama_i1:
148 duration_time_i: 2.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
149 V_id: 8 li: 5.0 xi: 2.5 bow of i: 0.0 tail of i: 5.0 gama_i0: 11.0 gama_i1: 13.0
150 duration_time_i: 2.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
151 V_id: 9 li: 6.0 xi: 3.0 bow of i: 0.0 tail of i: 6.0 gama_i0: 13.0 gama_i1: 17.0
152 duration_time_i: 4.0 demand_i: 140.0 work load_i: 140.0 work load gap_i: 0
153 V_id: 10 li: 9.0 xi: 4.5 bow of i: 0.0 tail of i: 9.0 gama_i0: 0.0 gama_i1: 1.0
154 duration_time_i: 1.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
155 V_id: 11 li: 5.0 xi: 16.0 bow of i: 13.5 tail of i: 18.5 gama_i0: 4.0 gama_i1
156 : 8.0 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
157
158 Algorithm finished and the total CPU time: 1247 s
159 End
160

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