

```

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=10325
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_19_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 = 57
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= 0.100000000000000009
32     gen = 0
33
34 Iteration begin:
35 Beging the No. 0 iteration:
36   obj[0] = 83.80   temp_best_value_gen = 83.80
37   The No. 0 iteration is finished!
38
39 Beging the No. 1 iteration:
40   obj[gen-1] = 83.80   temp_best_value_gen = 83.80
41   No, maintain solution and obj[gen] = 83.80 , and the tolerance_counter = 1
42   solution chromosome =
43     first level: [ [ 3. 8.5 12.5 17. 24.5 26.5 2.5 4. 3.5 1.5 3.5 2. 3. 2.
44 2. 2.5 2.5 2. 2.5]
45     second level: [ 2. 4. 0. 2. 0. 2. 0. 6. 8. 9. 13. 15. 18. 21. 4. 24. 26. 27.
46 31.]
47     third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
48   The No. 1 iteration is finished!
49
50 Beging the No. 2 iteration:
51   obj[gen-1] = 83.80   temp_best_value_gen = 83.80
52   No, maintain solution and obj[gen] = 83.80 , and the tolerance_counter = 2
53   solution chromosome =
54     first level: [ [ 3. 8.5 12.5 17. 24.5 26.5 2.5 4. 3.5 1.5 3.5 2. 3. 2.
55 2. 2.5 2.5 2. 2.5]
56     second level: [ 2. 4. 0. 2. 0. 2. 0. 6. 8. 9. 13. 15. 18. 21. 4. 24. 26. 27.
57 31.]
58     third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
59   The No. 2 iteration is finished!
60
61 Beging the No. 3 iteration:
62   obj[gen-1] = 83.80   temp_best_value_gen = 83.80
63   No, maintain solution and obj[gen] = 83.80 , and the tolerance_counter = 3
64   solution chromosome =
65     first level: [ [ 3. 8.5 12.5 17. 24.5 26.5 2.5 4. 3.5 1.5 3.5 2. 3. 2.
66 2. 2.5 2.5 2. 2.5]
67     second level: [ 2. 4. 0. 2. 0. 2. 0. 6. 8. 9. 13. 15. 18. 21. 4. 24. 26. 27.
68 31.]
69     third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
70   The No. 3 iteration is finished!
71
72 Beging the No. 4 iteration:
73   obj[gen-1] = 83.80   temp_best_value_gen = 83.80
74   No, maintain solution and obj[gen] = 83.80 , and the tolerance_counter = 4
75   solution chromosome =
76     first level: [ [ 3. 8.5 12.5 17. 24.5 26.5 2.5 4. 3.5 1.5 3.5 2. 3. 2.
77 2. 2.5 2.5 2. 2.5]
78     second level: [ 2. 4. 0. 2. 0. 2. 0. 6. 8. 9. 13. 15. 18. 21. 4. 24. 26. 27.
79 31.]

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80   third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
81   The No. 4 iteration is finished!
82
83   Beging the No. 5 iteration:
84   obj[gen-1] = 83.80   temp_best_value_gen = 83.80
85   No, maintain solution and obj[gen] = 83.80 , and the tolerance_counter = 5
86   solution chromosome =
87   first level: [ [ 3.   8.5 12.5 17.  24.5 26.5  2.5 4.   3.5  1.5 3.5  2.   3.   2.
88   2.   2.5 2.5 2.   2.5]
89   second level: [ 2.  4.  0.  2.  0.  2.  0.  6.  8.  9. 13. 15. 18. 21.  4. 24. 26. 27.
90   31.]
91   third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
92   The No. 5 iteration is finished!
93
94   Beging the No. 6 iteration:
95   obj[gen-1] = 83.80   temp_best_value_gen = 83.80
96   No, maintain solution and obj[gen] = 83.80 , and the tolerance_counter = 6
97   solution chromosome =
98   first level: [ [ 3.   8.5 12.5 17.  24.5 26.5  2.5 4.   3.5  1.5 3.5  2.   3.   2.
99   2.   2.5 2.5 2.   2.5]
100  second level: [ 2.  4.  0.  2.  0.  2.  0.  6.  8.  9. 13. 15. 18. 21.  4. 24. 26. 27.
101  31.]
102  third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
103  The No. 6 iteration is finished!
104
105
106  -----
107  The iteration is terminated and then visulize the solution:
108  solution chromosome =
109  first level: [ [ 3.   8.5 12.5 17.  24.5 26.5  2.5 4.   3.5  1.5 3.5  2.   3.   2.
110  2.   2.5 2.5 2.   2.5]
111  second level: [ 2.  4.  0.  2.  0.  2.  0.  6.  8.  9. 13. 15. 18. 21.  4. 24. 26. 27.
112  31.]
113  third level: [6. 5. 2. 4. 3. 3. 4. 6. 7. 2. 2. 2. 2. 2. 4. 4. 5. 2. 3.] ]
114  Objective function values and some other indicators:
115  Obj0 = 32.00           Obj1 = 230.00           Obj0 + Obj1 = 262.00
116  Total movement of crane: 18.00
117  Total waiting time in berth position: 212.00
118  Total index of q during berthing: 423.00
119  Specific arrangement for each vessel:
120  V_id: 0           li: 6.0           xi: 3.0           bow of i: 0.0           tail of i: 6.0           gama_i0: 2.0           gama_i1: 4.0
121  duration_time_i: 2.0           demand_i: 160.0           work load_i: 160.0           work load gap_i: 0
122  V_id: 1           li: 5.0           xi: 8.5           bow of i: 6.0           tail of i: 11.0           gama_i0: 4.0           gama_i1: 6.0
123  duration_time_i: 2.0           demand_i: 120.0           work load_i: 120.0           work load gap_i: 0
124  V_id: 2           li: 3.0           xi: 12.5           bow of i: 11.0           tail of i: 14.0           gama_i0: 0.0           gama_i1: 3
125  duration_time_i: 3.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
126  V_id: 3           li: 6.0           xi: 17.0           bow of i: 14.0           tail of i: 20.0           gama_i0: 2.0           gama_i1: 3
127  duration_time_i: 1.0           demand_i: 60.0           work load_i: 60.0           work load gap_i: 0
128  V_id: 4           li: 9.0           xi: 24.5           bow of i: 20.0           tail of i: 29.0           gama_i0: 0.0           gama_i1: 2
129  duration_time_i: 2.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
130  V_id: 5           li: 7.0           xi: 26.5           bow of i: 23.0           tail of i: 30.0           gama_i0: 2.0           gama_i1: 4
131  duration_time_i: 2.0           demand_i: 80.0           work load_i: 80.0           work load gap_i: 0
132  V_id: 6           li: 5.0           xi: 2.5           bow of i: 0.0           tail of i: 5.0           gama_i0: 0.0           gama_i1: 2.0
133  duration_time_i: 2.0           demand_i: 120.0           work load_i: 120.0           work load gap_i: 0
134  V_id: 7           li: 8.0           xi: 4.0           bow of i: 0.0           tail of i: 8.0           gama_i0: 6.0           gama_i1: 8.0
135  duration_time_i: 2.0           demand_i: 160.0           work load_i: 160.0           work load gap_i: 0
136  V_id: 8           li: 7.0           xi: 3.5           bow of i: 0.0           tail of i: 7.0           gama_i0: 8.0           gama_i1: 9.0
137  duration_time_i: 1.0           demand_i: 80.0           work load_i: 80.0           work load gap_i: 0
138  V_id: 9           li: 3.0           xi: 1.5           bow of i: 0.0           tail of i: 3.0           gama_i0: 9.0           gama_i1: 13.0
139  duration_time_i: 4.0           demand_i: 160.0           work load_i: 160.0           work load gap_i: 0
140  V_id: 10          li: 7.0           xi: 3.5           bow of i: 0.0           tail of i: 7.0           gama_i0: 13.0           gama_i1: 15.
141  duration_time_i: 2.0           demand_i: 80.0           work load_i: 80.0           work load gap_i: 0
142  V_id: 11          li: 4.0           xi: 2.0           bow of i: 0.0           tail of i: 4.0           gama_i0: 15.0           gama_i1: 18.
143  duration_time_i: 3.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
144  V_id: 12          li: 6.0           xi: 3.0           bow of i: 0.0           tail of i: 6.0           gama_i0: 18.0           gama_i1: 21.
145  duration_time_i: 3.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
146  V_id: 13          li: 4.0           xi: 2.0           bow of i: 0.0           tail of i: 4.0           gama_i0: 21.0           gama_i1: 24.
147  duration_time_i: 3.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
148  V_id: 14          li: 4.0           xi: 2.0           bow of i: 0.0           tail of i: 4.0           gama_i0: 4.0           gama_i1: 6.0
149  duration_time_i: 2.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
150  V_id: 15          li: 5.0           xi: 2.5           bow of i: 0.0           tail of i: 5.0           gama_i0: 24.0           gama_i1: 26.
151  duration_time_i: 2.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
152  V_id: 16          li: 5.0           xi: 2.5           bow of i: 0.0           tail of i: 5.0           gama_i0: 26.0           gama_i1: 27.
153  duration_time_i: 1.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
154  V_id: 17          li: 4.0           xi: 2.0           bow of i: 0.0           tail of i: 4.0           gama_i0: 27.0           gama_i1: 31.
155  duration_time_i: 4.0           demand_i: 140.0           work load_i: 140.0           work load gap_i: 0
156  V_id: 18          li: 5.0           xi: 2.5           bow of i: 0.0           tail of i: 5.0           gama_i0: 31.0           gama_i1: 33.
157  duration_time_i: 2.0           demand_i: 100.0           work load_i: 100.0           work load gap_i: 0
158
159  Algorithm finished and the total CPU time: 1323 s
160  End
161

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