```
 1  "E:\1 □□□□\3 □□□□□\1 □□□□□□□\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=18211
 2
 3  import sys; print('Python %s on %s' % (sys.version, sys.platform))
 4  sys.path.extend(['E:\\1 □□□□\\3 □□□□□\\1 □□□□□□□\\1 □□□□□□□□□\\1_□□□□□□_□□□□\\1_LW_□□□□2\\6 □□□□\\2 python code\\
    01_My_Python_Code', 'E:/1 □□□□/3 □□□□□/1 □□□□□□□/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_□□□□□□_□□□□/1_LW_□□□□2/6 □□□□/2 python code/01_My_Python_Code/
    main_BACASP_official_ENSGA-II.py', wdir='E:/1 □□□□/3 □□□□□/1 □□□□□□□/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_8_6 _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 =  24
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] = 24.40      temp_best_value_gen = 24.40
37      The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40      obj[gen-1] = 24.40   temp_best_value_gen = 24.40
41      No, maintain solution  and obj[gen] = 24.40 , and the tolerance_counter = 1
42      solution chromosome =
43        first level: [ [ 4.5 13.5 20.5 25.5 2.   4.   4.   1.5]
44        second level:  [2. 0. 3. 1. 0. 4. 6. 8.]
45        third level:  [6. 2. 2. 6. 4. 3. 7. 2.] ]
46      The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49      obj[gen-1] = 24.40   temp_best_value_gen = 22.90
50      Yes, update solution and obj[gen] = 22.90
51      solution chromosome =
52        first level: [ [ 4.5  4.5 20.5 25.5 2.   4.   4.   13.5]
53        second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
54        third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
55      The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58      obj[gen-1] = 22.90   temp_best_value_gen = 22.90
59      No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 1
60      solution chromosome =
61        first level: [ [ 4.5  4.5 20.5 25.5 2.   4.   4.   13.5]
62        second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
63        third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
64      The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67      obj[gen-1] = 22.90   temp_best_value_gen = 22.90
68      No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 2
69      solution chromosome =
70        first level: [ [ 4.5  4.5 20.5 25.5 2.   4.   4.   13.5]
71        second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
72        third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
73      The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76      obj[gen-1] = 22.90   temp_best_value_gen = 22.90
77      No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 3
78      solution chromosome =
79        first level: [ [ 4.5  4.5 20.5 25.5 2.   4.   4.   13.5]
```

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80      second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
81      third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
82    The No. 5  iteration is finished!
83
84  Beging the No. 6  iteration:
85      obj[gen-1] = 22.90   temp_best_value_gen = 22.90
86      No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 4
87      solution chromosome =
88      first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
89      second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
90      third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
91    The No. 6  iteration is finished!
92
93  Beging the No. 7  iteration:
94      obj[gen-1] = 22.90   temp_best_value_gen = 22.90
95      No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 5
96      solution chromosome =
97      first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
98      second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
99      third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
100   The No. 7  iteration is finished!
101
102 Beging the No. 8  iteration:
103     obj[gen-1] = 22.90   temp_best_value_gen = 22.90
104     No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 6
105     solution chromosome =
106     first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
107     second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
108     third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
109   The No. 8  iteration is finished!
110
111 Beging the No. 9  iteration:
112     obj[gen-1] = 22.90   temp_best_value_gen = 22.90
113     No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 7
114     solution chromosome =
115     first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
116     second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
117     third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
118   The No. 9  iteration is finished!
119
120 Beging the No. 10  iteration:
121     obj[gen-1] = 22.90   temp_best_value_gen = 22.90
122     No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 8
123     solution chromosome =
124     first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
125     second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
126     third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
127   The No. 10  iteration is finished!
128
129 Beging the No. 11  iteration:
130     obj[gen-1] = 22.90   temp_best_value_gen = 22.90
131     No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 9
132     solution chromosome =
133     first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
134     second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
135     third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
136   The No. 11  iteration is finished!
137
138 Beging the No. 12  iteration:
139     obj[gen-1] = 22.90   temp_best_value_gen = 22.90
140     No, maintain solution  and obj[gen] = 22.90 , and the tolerance_counter = 10
141     solution chromosome =
142     first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
143     second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
144     third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
145   The No. 12  iteration is finished!
146
147
148 ---------------------------------------------------------------------------------
149 The iteration is terminated and then visulize the solution:
150     solution chromosome =
151     first level: [ [ 4.5  4.5 20.5 25.5  2.   4.   4.  13.5]
152     second level:  [2. 8. 3. 1. 0. 4. 6. 4.]
153     third level:  [6. 2. 2. 6. 4. 3. 7. 3.] ]
154     Objective function values and some other indicators:
155       Obj0 = 9.00           Obj1 = 58.00          Obj0 + Obj1 = 67.00
156     Total movement of crane: 30.00
157     Total waiting time in berth position: 28.00
158     Total index of q during berthing: 338.00
159   Specific arrangement for each vessel:
160     V_id: 0         li: 9.0        xi: 4.5        bow of i: 0.0        tail of i: 9.0        gama_i0: 2.0        gama_i1: 4.0
                duration_time_i: 2.0        demand_i: 160.0        work load_i: 160.0        work load gap_i: 0
161     V_id: 1         li: 9.0        xi: 4.5        bow of i: 0.0        tail of i: 9.0        gama_i0: 8.0        gama_i1: 10.0
                duration_time_i: 2.0        demand_i: 80.0        work load_i: 80.0        work load gap_i: 0
```

162	V_id: 2	li: 5.0	xi: 20.5	bow of i: 18.0	tail of i: 23.0	gama_i0: 3.0	gama_i1: 6
	.0	duration_time_i: 3.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
163	V_id: 3	li: 9.0	xi: 25.5	bow of i: 21.0	tail of i: 30.0	gama_i0: 1.0	gama_i1: 2
	.0	duration_time_i: 1.0	demand_i: 100.0	work load_i: 100.0	work load gap_i: 0		
164	V_id: 4	li: 4.0	xi: 2.0	bow of i: 0.0	tail of i: 4.0	gama_i0: 0.0	gama_i1: 1.0
		duration_time_i: 1.0	demand_i: 80.0	work load_i: 80.0	work load gap_i: 0		
165	V_id: 5	li: 8.0	xi: 4.0	bow of i: 0.0	tail of i: 8.0	gama_i0: 4.0	gama_i1: 6.0
		duration_time_i: 2.0	demand_i: 100.0	work load_i: 100.0	work load gap_i: 0		
166	V_id: 6	li: 8.0	xi: 4.0	bow of i: 0.0	tail of i: 8.0	gama_i0: 6.0	gama_i1: 8.0
		duration_time_i: 2.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
167	V_id: 7	li: 3.0	xi: 13.5	bow of i: 12.0	tail of i: 15.0	gama_i0: 4.0	gama_i1: 6
	.0	duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
168							
169	Algorithm finished and the total CPU time: 1087 s						
170	End						
171							