```
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=14744
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_3_5 _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 =  9
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] = 10.99     temp_best_value_gen = 10.99
37     The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40     obj[gen-1] = 10.99   temp_best_value_gen = 10.99
41     No, maintain solution  and obj[gen] = 10.99 , and the tolerance_counter = 1
42     solution chromosome =
43         first level: [ [6.56 4.96 2.15]
44         second level:  [0. 5. 2.]
45         third level:  [4. 8. 3.] ]
46     The No. 1  iteration is finished!
47
48  Beging the No. 2  iteration:
49     obj[gen-1] = 10.99   temp_best_value_gen = 10.99
50     No, maintain solution  and obj[gen] = 10.99 , and the tolerance_counter = 2
51     solution chromosome =
52         first level: [ [6.56 4.96 2.15]
53         second level:  [0. 5. 2.]
54         third level:  [4. 8. 3.] ]
55     The No. 2  iteration is finished!
56
57  Beging the No. 3  iteration:
58     obj[gen-1] = 10.99   temp_best_value_gen = 6.00
59     Yes, update solution and obj[gen] = 6.00
60     solution chromosome =
61         first level: [ [ 4.5 19.5 13.5]
62         second level:  [0. 2. 1.]
63         third level:  [4. 3. 3.] ]
64     The No. 3  iteration is finished!
65
66  Beging the No. 4  iteration:
67     obj[gen-1] = 6.00     temp_best_value_gen = 6.00
68     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 1
69     solution chromosome =
70         first level: [ [ 4.5 19.5 13.5]
71         second level:  [0. 2. 1.]
72         third level:  [4. 3. 3.] ]
73     The No. 4  iteration is finished!
74
75  Beging the No. 5  iteration:
76     obj[gen-1] = 6.00     temp_best_value_gen = 6.00
77     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 2
78     solution chromosome =
79         first level: [ [ 4.5 19.5 13.5]
```

```
 80        second level:  [0. 2. 1.]
 81        third level:  [4. 3. 3.] ]
 82     The No. 5  iteration is finished!
 83
 84  Beging the No. 6  iteration:
 85     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
 86     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 3
 87     solution chromosome =
 88        first level: [ [ 4.5 19.5 13.5]
 89        second level:  [0. 2. 1.]
 90        third level:  [4. 3. 3.] ]
 91     The No. 6  iteration is finished!
 92
 93  Beging the No. 7  iteration:
 94     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
 95     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 4
 96     solution chromosome =
 97        first level: [ [ 4.5 19.5 13.5]
 98        second level:  [0. 2. 1.]
 99        third level:  [4. 3. 3.] ]
100     The No. 7  iteration is finished!
101
102  Beging the No. 8  iteration:
103     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
104     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 5
105     solution chromosome =
106        first level: [ [ 4.5 19.5 13.5]
107        second level:  [0. 2. 1.]
108        third level:  [4. 3. 3.] ]
109     The No. 8  iteration is finished!
110
111  Beging the No. 9  iteration:
112     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
113     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 6
114     solution chromosome =
115        first level: [ [ 4.5 19.5 13.5]
116        second level:  [0. 2. 1.]
117        third level:  [4. 3. 3.] ]
118     The No. 9  iteration is finished!
119
120  Beging the No. 10  iteration:
121     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
122     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 7
123     solution chromosome =
124        first level: [ [ 4.5 19.5 13.5]
125        second level:  [0. 2. 1.]
126        third level:  [4. 3. 3.] ]
127     The No. 10  iteration is finished!
128
129  Beging the No. 11  iteration:
130     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
131     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 8
132     solution chromosome =
133        first level: [ [ 4.5 19.5 13.5]
134        second level:  [0. 2. 1.]
135        third level:  [4. 3. 3.] ]
136     The No. 11  iteration is finished!
137
138  Beging the No. 12  iteration:
139     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
140     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 9
141     solution chromosome =
142        first level: [ [ 4.5 19.5 13.5]
143        second level:  [0. 2. 1.]
144        third level:  [4. 3. 3.] ]
145     The No. 12  iteration is finished!
146
147  Beging the No. 13  iteration:
148     obj[gen-1] = 6.00    temp_best_value_gen = 6.00
149     No, maintain solution  and obj[gen] = 6.00 , and the tolerance_counter = 10
150     solution chromosome =
151        first level: [ [ 4.5 19.5 13.5]
152        second level:  [0. 2. 1.]
153        third level:  [4. 3. 3.] ]
154     The No. 13  iteration is finished!
155
156
157  --------------------------------------------------------------------------------
158  The iteration is terminated and then visulize the solution:
159     solution chromosome =
160        first level: [ [ 4.5 19.5 13.5]
161        second level:  [0. 2. 1.]
162        third level:  [4. 3. 3.] ]
163     Objective function values and some other indicators:
```

164	Obj0 = 3.00	Obj1 = 3.00	Obj0 + Obj1 = 6.00			

164   Obj0 = 3.00   Obj1 = 3.00   Obj0 + Obj1 = 6.00

165   Total movement of crane: 0.00

166   Total waiting time in berth position: 3.00

167   Total index of q during berthing: 191.00

168   Specific arrangement for each vessel:

169   V_id: 0   li: 9.0   xi: 4.5   bow of i: 0.0   tail of i: 9.0   gama_i0: 0.0   gama_i1: 2.0
         duration_time_i: 2.0   demand_i: 140.0   work load_i: 140.0   work load gap_i: 0

170   V_id: 1   li: 9.0   xi: 19.5   bow of i: 15.0   tail of i: 24.0   gama_i0: 2.0   gama_i1: 4
.0   duration_time_i: 2.0   demand_i: 100.0   work load_i: 100.0   work load gap_i: 0

171   V_id: 2   li: 3.0   xi: 13.5   bow of i: 12.0   tail of i: 15.0   gama_i0: 1.0   gama_i1: 4
.0   duration_time_i: 3.0   demand_i: 160.0   work load_i: 160.0   work load gap_i: 0

172

173 Algorithm finished and the total CPU time: 551 s

174 End

175