..

```
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=8524
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_18_7 _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 =  54
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] = 90.71     temp_best_value_gen = 90.71
37     The No. 0  iteration is finished!
38
39  Beging the No. 1  iteration:
40     obj[gen-1] = 90.71   temp_best_value_gen = 90.71
41     No, maintain solution  and obj[gen] = 90.71 , and the tolerance_counter = 1
42     solution chromosome =
43       first level: [ [ 4.    2.05 2.54 4.03  6.99  2.64  2.15  5.13  4.72  4.92  2.76  5.94
44   5.27  6.   11.   10.5 11.   10.5 ]
45         second level:  [ 1.  3.  7.  9. 12. 15. 17. 21.  6. 24. 28. 30. 32.  3.  2.  4.  6. 15.]
46         third level:  [3. 2. 4. 2. 2. 3. 2. 2. 6. 2. 3. 2. 2. 2. 3. 3. 2. 2.] ]
47     The No. 1  iteration is finished!
48
49  Beging the No. 2  iteration:
50     obj[gen-1] = 90.71   temp_best_value_gen = 90.71
51     No, maintain solution  and obj[gen] = 90.71 , and the tolerance_counter = 2
52     solution chromosome =
53       first level: [ [ 4.    2.05 2.54 4.03  6.99  2.64  2.15  5.13  4.72  4.92  2.76  5.94
54   5.27  6.   11.   10.5 11.   10.5 ]
55         second level:  [ 1.  3.  7.  9. 12. 15. 17. 21.  6. 24. 28. 30. 32.  3.  2.  4.  6. 15.]
56         third level:  [3. 2. 4. 2. 2. 3. 2. 2. 6. 2. 3. 2. 2. 2. 3. 3. 2. 2.] ]
57     The No. 2  iteration is finished!
58
59  Beging the No. 3  iteration:
60     obj[gen-1] = 90.71   temp_best_value_gen = 90.71
61     No, maintain solution  and obj[gen] = 90.71 , and the tolerance_counter = 3
62     solution chromosome =
63       first level: [ [ 4.    2.05 2.54 4.03  6.99  2.64  2.15  5.13  4.72  4.92  2.76  5.94
64   5.27  6.   11.   10.5 11.   10.5 ]
65         second level:  [ 1.  3.  7.  9. 12. 15. 17. 21.  6. 24. 28. 30. 32.  3.  2.  4.  6. 15.]
66         third level:  [3. 2. 4. 2. 2. 3. 2. 2. 6. 2. 3. 2. 2. 2. 3. 3. 2. 2.] ]
67     The No. 3  iteration is finished!
68
69  Beging the No. 4  iteration:
70     obj[gen-1] = 90.71   temp_best_value_gen = 90.71
71     No, maintain solution  and obj[gen] = 90.71 , and the tolerance_counter = 4
72     solution chromosome =
73       first level: [ [ 4.    2.05 2.54 4.03  6.99  2.64  2.15  5.13  4.72  4.92  2.76  5.94
74   5.27  6.   11.   10.5 11.   10.5 ]
75         second level:  [ 1.  3.  7.  9. 12. 15. 17. 21.  6. 24. 28. 30. 32.  3.  2.  4.  6. 15.]
76         third level:  [3. 2. 4. 2. 2. 3. 2. 2. 6. 2. 3. 2. 2. 2. 3. 3. 2. 2.] ]
77     The No. 4  iteration is finished!
78
79  Beging the No. 5  iteration:
```

```
 80     obj[gen-1] = 90.71   temp_best_value_gen = 90.71
 81     No, maintain solution  and obj[gen] = 90.71 , and the tolerance_counter = 5
 82     solution chromosome =
 83       first level: [ [ 4.   2.05 2.54 4.03 6.99 2.64 2.15 5.13 4.72 4.92 2.76 5.94
 84    5.27 6.   11.   10.5 11.   10.5 ]
 85       second level:  [ 1.  3.  7.  9. 12. 15. 17. 21.  6. 24. 28. 30. 32.  3.  2.  4.  6. 15.]
 86       third level:  [3. 2. 4. 2. 2. 3. 2. 2. 6. 2. 3. 2. 2. 2. 3. 3. 2. 2.] ]
 87     The No. 5  iteration is finished!
 88
 89  Beging the No. 6  iteration:
 90     obj[gen-1] = 90.71   temp_best_value_gen = 87.51
 91     Yes, update solution and obj[gen] = 87.51
 92     solution chromosome =
 93       first level: [ [ 4.   2.05 2.54 3.15 6.99 2.64 4.03 5.13 4.72 4.92 2.76 5.94
 94    5.27 6.   11.   10.5 11.   10.5 ]
 95       second level:  [ 1.  3. 14.  6.  9. 12. 18. 21. 23. 26. 29. 11. 31.  3.  2.  4. 12. 16.]
 96       third level:  [3. 2. 2. 2. 4. 4. 3. 3. 2. 3. 5. 5. 5. 2. 3. 3. 2. 2.] ]
 97     The No. 6  iteration is finished!
 98
 99
100  --------------------------------------------------------------------------------------
101  The iteration is terminated and then visulize the solution:
102     solution chromosome =
103       first level: [ [ 4.   2.05 2.54 3.15 6.99 2.64 4.03 5.13 4.72 4.92 2.76 5.94
104    5.27 6.   11.   10.5 11.   10.5 ]
105       second level:  [ 1.  3. 14.  6.  9. 12. 18. 21. 23. 26. 29. 11. 31.  3.  2.  4. 12. 16.]
106       third level:  [3. 2. 2. 2. 4. 4. 3. 3. 2. 3. 5. 5. 5. 2. 3. 3. 2. 2.] ]
107     Objective function values and some other indicators:
108       Obj0 = 32.00          Obj1 = 267.12          Obj0 + Obj1 = 299.12
109       Total movement of crane: 26.12
110       Total waiting time in berth position: 241.00
111       Total index of q during berthing: 384.00
112     Specific arrangement for each vessel:
```

Line	V_id	li	xi	bow of i	tail of i	gama_i0	gama_i1
113	V_id: 0	li: 8.0	xi: 4.0	bow of i: 0.0	tail of i: 8.0	gama_i0: 1.0	gama_i1: 3.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
114	V_id: 1	li: 4.0	xi: 2.0	bow of i: 0.0	tail of i: 4.0	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		
115	V_id: 2	li: 5.0	xi: 2.5	bow of i: 0.0	tail of i: 5.0	gama_i0: 14.0	gama_i1: 18.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
116	V_id: 3	li: 6.0	xi: 3.2	bow of i: 0.2	tail of i: 6.2	gama_i0: 6.0	gama_i1: 9.0
		duration_time_i: 3.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
117	V_id: 4	li: 9.0	xi: 7.0	bow of i: 2.5	tail of i: 11.5	gama_i0: 9.0	gama_i1: 11.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
118	V_id: 5	li: 5.0	xi: 2.6	bow of i: 0.1	tail of i: 5.1	gama_i0: 12.0	gama_i1: 14.0
		duration_time_i: 2.0	demand_i: 100.0	work load_i: 100.0	work load gap_i: 0		
119	V_id: 6	li: 3.0	xi: 4.0	bow of i: 2.5	tail of i: 5.5	gama_i0: 18.0	gama_i1: 21.0
		duration_time_i: 3.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
120	V_id: 7	li: 7.0	xi: 5.1	bow of i: 1.6	tail of i: 8.6	gama_i0: 21.0	gama_i1: 23.0
		duration_time_i: 2.0	demand_i: 100.0	work load_i: 100.0	work load gap_i: 0		
121	V_id: 8	li: 7.0	xi: 4.7	bow of i: 1.2	tail of i: 8.2	gama_i0: 23.0	gama_i1: 26.0
		duration_time_i: 3.0	demand_i: 100.0	work load_i: 100.0	work load gap_i: 0		
122	V_id: 9	li: 7.0	xi: 4.9	bow of i: 1.4	tail of i: 8.4	gama_i0: 26.0	gama_i1: 29.0
		duration_time_i: 3.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		
123	V_id: 10	li: 5.0	xi: 2.8	bow of i: 0.3	tail of i: 5.3	gama_i0: 29.0	gama_i1: 31.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
124	V_id: 11	li: 7.0	xi: 5.9	bow of i: 2.4	tail of i: 9.4	gama_i0: 11.0	gama_i1: 12.0
		duration_time_i: 1.0	demand_i: 80.0	work load_i: 80.0	work load gap_i: 0		
125	V_id: 12	li: 6.0	xi: 5.3	bow of i: 2.3	tail of i: 8.3	gama_i0: 31.0	gama_i1: 33.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
126	V_id: 13	li: 3.0	xi: 6.0	bow of i: 4.5	tail of i: 7.5	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		
127	V_id: 14	li: 5.0	xi: 11.0	bow of i: 8.5	tail of i: 13.5	gama_i0: 2.0	gama_i1: 4.0
		duration_time_i: 2.0	demand_i: 80.0	work load_i: 80.0	work load gap_i: 0		
128	V_id: 15	li: 4.0	xi: 10.5	bow of i: 8.5	tail of i: 12.5	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		
129	V_id: 16	li: 5.0	xi: 11.0	bow of i: 8.5	tail of i: 13.5	gama_i0: 12.0	gama_i1: 16.0
		duration_time_i: 4.0	demand_i: 140.0	work load_i: 140.0	work load gap_i: 0		
130	V_id: 17	li: 4.0	xi: 10.5	bow of i: 8.5	tail of i: 12.5	gama_i0: 16.0	gama_i1: 20.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		

```
131
132  Algorithm finished and the total CPU time: 1240 s
133  End
134
```