```
"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=50866

import sys; print('Python %s on %s' % (sys.version, sys.platform))
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'])

PyDev console: starting.

Python 3.9.7 (tags/v3.9.7:1016ef3, Aug 30 2021, 20:19:38) [MSC v.1929 64 bit (AMD64)] on win32
>>> 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')
Backend TkAgg is interactive backend. Turning interactive mode on.
Waiting 1s.....

This is the  R_6_7 _standerd_test.xlsx  optimization process solved by ENSGA-II algorithm.

Start

Before iteration:
    Read basic data
    Parameter setting:
        trail =  58
        Pop_size =  30
        Tolerance_iteration_unchanged_number =  10
        Chrom_size =  18
        Iter_num_GA =  300
        Select_rate =  0.85
        Crossover_rate =  0.95
        Mutation rate =  0.95
        Mu_oper_type =  1
        vessel_move_way =  2
        coefficient for Obj1=  1.9
        coefficient for Obj2=  0.10000000000000009
        gen =  0

Iteration begin:
Beging the No. 0  iteration:
    obj[0] = 23.80      temp_best_value_gen = 23.80
    The No. 0  iteration is finished!

Beging the No. 1  iteration:
    obj[gen-1] = 23.80   temp_best_value_gen = 23.80
    No, maintain solution  and obj[gen] = 23.80 , and the tolerance_counter = 1
    solution chromosome =
        first level: [ [ 2.5  8.5 16.  21.5 26.5 28.5]
        second level:  [3. 3. 0. 7. 6. 1.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 1  iteration is finished!

Beging the No. 2  iteration:
    obj[gen-1] = 23.80   temp_best_value_gen = 22.70
    Yes, update solution and obj[gen] = 22.70
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 2  iteration is finished!

Beging the No. 3  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 1
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 3  iteration is finished!

Beging the No. 4  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 2
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 4  iteration is finished!

Beging the No. 5  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 3
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
```

```
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 5  iteration is finished!

Beging the No. 6  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 4
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 6  iteration is finished!

Beging the No. 7  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 5
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 7  iteration is finished!

Beging the No. 8  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 6
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 8  iteration is finished!

Beging the No. 9  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 7
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 9  iteration is finished!

Beging the No. 10  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 8
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 10  iteration is finished!

Beging the No. 11  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 9
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 11  iteration is finished!

Beging the No. 12  iteration:
    obj[gen-1] = 22.70   temp_best_value_gen = 22.70
    No, maintain solution  and obj[gen] = 22.70 , and the tolerance_counter = 10
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    The No. 12  iteration is finished!


----------------------------------------------------------------------------------------
The iteration is terminated and then visulize the solution:
    solution chromosome =
        first level: [ [ 2.5  8.5 26.  21.5 26.5 16. ]
        second level:  [3. 3. 1. 7. 6. 0.]
        third level:  [2. 6. 2. 2. 2. 2.] ]
    Objective function values and some other indicators:
        Obj0 = 10.00            Obj1 = 37.00            Obj0 + Obj1 = 47.00
        Total movement of crane: 17.00
        Total waiting time in berth position: 20.00
        Total index of q during berthing: 562.00
    Specific arrangement for each vessel:
        V_id:  0            li: 5.0             xi: 2.5             bow of i: 0.0             tail of i: 5.0             gama_i0: 3.0             gama_i1: 5.0
                    duration_time_i: 2.0            demand_i: 60.0          work load_i: 60.0           work load gap_i: 0
        V_id:  1            li: 7.0             xi: 8.5             bow of i: 5.0             tail of i: 12.0            gama_i0: 3.0             gama_i1: 5.0
                    duration_time_i: 2.0            demand_i: 160.0         work load_i: 160.0          work load gap_i: 0
```

```
V_id: 2 li: 8.0 xi: 26.0 bow of i: 22.0 tail of i: 30.0 gama_i0: 1.0 gama_i1: 4.0 duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0
V_id: 3 li: 3.0 xi: 21.5 bow of i: 20.0 tail of i: 23.0 gama_i0: 7.0 gama_i1: 11.0 duration_time_i: 4.0 demand_i: 160.0 work load_i: 160.0 work load gap_i: 0
V_id: 4 li: 7.0 xi: 26.5 bow of i: 23.0 tail of i: 30.0 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
V_id: 5 li: 3.0 xi: 16.0 bow of i: 14.5 tail of i: 17.5 gama_i0: 0.0 gama_i1: 3.0 duration_time_i: 3.0 demand_i: 120.0 work load_i: 120.0 work load gap_i: 0

Algorithm finished and the total CPU time: 888 s
End
```