```
"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=57883

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_19_1 _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 =  57
        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] = 77.20      temp_best_value_gen = 77.20
    The No. 0  iteration is finished!

Beging the No. 1  iteration:
    obj[gen-1] = 77.20   temp_best_value_gen = 77.20
    No, maintain solution  and obj[gen] = 77.20 , and the tolerance_counter = 1
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
  2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    The No. 1  iteration is finished!

Beging the No. 2  iteration:
    obj[gen-1] = 77.20   temp_best_value_gen = 77.20
    No, maintain solution  and obj[gen] = 77.20 , and the tolerance_counter = 2
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
  2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    The No. 2  iteration is finished!

Beging the No. 3  iteration:
    obj[gen-1] = 77.20   temp_best_value_gen = 77.20
    No, maintain solution  and obj[gen] = 77.20 , and the tolerance_counter = 3
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
  2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    The No. 3  iteration is finished!

Beging the No. 4  iteration:
    obj[gen-1] = 77.20   temp_best_value_gen = 77.20
    No, maintain solution  and obj[gen] = 77.20 , and the tolerance_counter = 4
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
  2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
```

```
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    The No. 4  iteration is finished!

Beging the No. 5  iteration:
    obj[gen-1] = 77.20   temp_best_value_gen = 77.20
    No, maintain solution  and obj[gen] = 77.20 , and the tolerance_counter = 5
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
 2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    The No. 5  iteration is finished!

Beging the No. 6  iteration:
    obj[gen-1] = 77.20   temp_best_value_gen = 77.20
    No, maintain solution  and obj[gen] = 77.20 , and the tolerance_counter = 6
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
 2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    The No. 6  iteration is finished!


--------------------------------------------------------------------------------
The iteration is terminated and then visulize the solution:
    solution chromosome =
        first level: [ [ 3.  10.  18.5 25.5 27.5  2.   3.   4.   4.   3.   4.   2.5  3.   3.5
 2.   2.5  3.5  4.5  3.5]
        second level:  [ 3.  3.  7.  5.  2.  4.  0.  1.  6.  8. 10. 12. 14. 16. 19. 21. 25.  2.
 28.]
        third level:  [6. 2. 6. 2. 2. 3. 6. 5. 4. 2. 2. 2. 2. 3. 3. 2. 3. 9. 3.] ]
    Objective function values and some other indicators:
        Obj0 = 30.00            Obj1 = 202.00            Obj0 + Obj1 = 232.00
        Total movement of crane: 16.00
        Total waiting time in berth position: 186.00
        Total index of q during berthing: 445.00
    Specific arrangement for each vessel:
        V_id:  0            li: 6.0            xi: 3.0            bow of i: 0.0            tail of i: 6.0            gama_i0: 3.0            gama_i1: 4.0
                duration_time_i: 1.0            demand_i: 60.0            work load_i: 60.0            work load gap_i: 0
        V_id:  1            li: 8.0            xi: 10.0            bow of i: 6.0            tail of i: 14.0            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:  2            li: 9.0            xi: 18.5            bow of i: 14.0            tail of i: 23.0            gama_i0: 7.0            gama_i1: 9
.0              duration_time_i: 2.0            demand_i: 160.0            work load_i: 160.0            work load gap_i: 0
        V_id:  3            li: 5.0            xi: 25.5            bow of i: 23.0            tail of i: 28.0            gama_i0: 5.0            gama_i1: 8
.0              duration_time_i: 3.0            demand_i: 100.0            work load_i: 100.0            work load gap_i: 0
        V_id:  4            li: 5.0            xi: 27.5            bow of i: 25.0            tail of i: 30.0            gama_i0: 2.0            gama_i1: 5
.0              duration_time_i: 3.0            demand_i: 120.0            work load_i: 120.0            work load gap_i: 0
        V_id:  5            li: 4.0            xi: 2.0            bow of i: 0.0            tail of i: 4.0            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
        V_id:  6            li: 6.0            xi: 3.0            bow of i: 0.0            tail of i: 6.0            gama_i0: 0.0            gama_i1: 1.0
                duration_time_i: 1.0            demand_i: 60.0            work load_i: 60.0            work load gap_i: 0
        V_id:  7            li: 8.0            xi: 4.0            bow of i: 0.0            tail of i: 8.0            gama_i0: 1.0            gama_i1: 2.0
                duration_time_i: 1.0            demand_i: 80.0            work load_i: 80.0            work load gap_i: 0
        V_id:  8            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: 140.0            work load_i: 140.0            work load gap_i: 0
        V_id:  9            li: 6.0            xi: 3.0            bow of i: 0.0            tail of i: 6.0            gama_i0: 8.0            gama_i1: 10.0
                duration_time_i: 2.0            demand_i: 60.0            work load_i: 60.0            work load gap_i: 0
        V_id:  10            li: 8.0            xi: 4.0            bow of i: 0.0            tail of i: 8.0            gama_i0: 10.0            gama_i1: 12.
0               duration_time_i: 2.0            demand_i: 80.0            work load_i: 80.0            work load gap_i: 0
        V_id:  11            li: 5.0            xi: 2.5            bow of i: 0.0            tail of i: 5.0            gama_i0: 12.0            gama_i1: 14.
0               duration_time_i: 2.0            demand_i: 60.0            work load_i: 60.0            work load gap_i: 0
        V_id:  12            li: 6.0            xi: 3.0            bow of i: 0.0            tail of i: 6.0            gama_i0: 14.0            gama_i1: 16.
0               duration_time_i: 2.0            demand_i: 60.0            work load_i: 60.0            work load gap_i: 0
        V_id:  13            li: 7.0            xi: 3.5            bow of i: 0.0            tail of i: 7.0            gama_i0: 16.0            gama_i1: 19.
0               duration_time_i: 3.0            demand_i: 140.0            work load_i: 140.0            work load gap_i: 0
        V_id:  14            li: 4.0            xi: 2.0            bow of i: 0.0            tail of i: 4.0            gama_i0: 19.0            gama_i1: 21.
0               duration_time_i: 2.0            demand_i: 100.0            work load_i: 100.0            work load gap_i: 0
        V_id:  15            li: 5.0            xi: 2.5            bow of i: 0.0            tail of i: 5.0            gama_i0: 21.0            gama_i1: 25.
0               duration_time_i: 4.0            demand_i: 160.0            work load_i: 160.0            work load gap_i: 0
        V_id:  16            li: 7.0            xi: 3.5            bow of i: 0.0            tail of i: 7.0            gama_i0: 25.0            gama_i1: 28.
0               duration_time_i: 3.0            demand_i: 160.0            work load_i: 160.0            work load gap_i: 0
        V_id:  17            li: 9.0            xi: 4.5            bow of i: 0.0            tail of i: 9.0            gama_i0: 2.0            gama_i1: 3.0
                duration_time_i: 1.0            demand_i: 60.0            work load_i: 60.0            work load gap_i: 0
        V_id:  18            li: 7.0            xi: 3.5            bow of i: 0.0            tail of i: 7.0            gama_i0: 28.0            gama_i1: 31.
0               duration_time_i: 3.0            demand_i: 160.0            work load_i: 160.0            work load gap_i: 0

Algorithm finished and the total CPU time: 1331 s
End
```