```
"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=39014

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_12_8 _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 =  36
        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] = 56.90      temp_best_value_gen = 56.90
    The No. 0  iteration is finished!

Beging the No. 1  iteration:
    obj[gen-1] = 56.90   temp_best_value_gen = 56.90
    No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 1
    solution chromosome =
        first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
        second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
        third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
    The No. 1  iteration is finished!

Beging the No. 2  iteration:
    obj[gen-1] = 56.90   temp_best_value_gen = 56.90
    No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 2
    solution chromosome =
        first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
        second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
        third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
    The No. 2  iteration is finished!

Beging the No. 3  iteration:
    obj[gen-1] = 56.90   temp_best_value_gen = 56.90
    No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 3
    solution chromosome =
        first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
        second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
        third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
    The No. 3  iteration is finished!

Beging the No. 4  iteration:
    obj[gen-1] = 56.90   temp_best_value_gen = 56.90
    No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 4
    solution chromosome =
        first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
        second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
        third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
    The No. 4  iteration is finished!

Beging the No. 5  iteration:
    obj[gen-1] = 56.90   temp_best_value_gen = 56.90
    No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 5
    solution chromosome =
        first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
    second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
    third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
  The No. 5  iteration is finished!

Beging the No. 6  iteration:
  obj[gen-1] = 56.90   temp_best_value_gen = 56.90
  No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 6
  solution chromosome =
    first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
    second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
    third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
  The No. 6  iteration is finished!

Beging the No. 7  iteration:
  obj[gen-1] = 56.90   temp_best_value_gen = 56.90
  No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 7
  solution chromosome =
    first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
    second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
    third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
  The No. 7  iteration is finished!

Beging the No. 8  iteration:
  obj[gen-1] = 56.90   temp_best_value_gen = 56.90
  No, maintain solution  and obj[gen] = 56.90 , and the tolerance_counter = 8
  solution chromosome =
    first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
    second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
    third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
  The No. 8  iteration is finished!


-------------------------------------------------------------------------------------
The iteration is terminated and then visulize the solution:
  solution chromosome =
    first level: [ [ 2.   4.5 14.5 18.  23.5 26.   4.5  4.   3.5  4.   8.5  3.5]
    second level:  [ 2. 21.  2.  6.  1.  4. 10. 13.  1. 17.  6.  4.]
    third level:  [4. 2. 3. 2. 3. 3. 3. 2. 7. 2. 2. 3.] ]
  Objective function values and some other indicators:
    Obj0 = 24.00        Obj1 = 113.00        Obj0 + Obj1 = 137.00
    Total movement of crane: 12.00
    Total waiting time in berth position: 87.00
    Total index of q during berthing: 547.00
  Specific arrangement for each vessel:
    V_id:  0        li: 4.0        xi: 2.0        bow of i: 0.0        tail of i: 4.0        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
    V_id:  1        li: 9.0        xi: 4.5        bow of i: 0.0        tail of i: 9.0        gama_i0: 21.0        gama_i1: 25.0
          duration_time_i: 4.0        demand_i: 140.0        work load_i: 140.0        work load gap_i: 0
    V_id:  2        li: 3.0        xi: 14.5        bow of i: 13.0        tail of i: 16.0        gama_i0: 2.0        gama_i1: 5
.0        duration_time_i: 3.0        demand_i: 140.0        work load_i: 140.0        work load gap_i: 0
    V_id:  3        li: 4.0        xi: 18.0        bow of i: 16.0        tail of i: 20.0        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:  4        li: 7.0        xi: 23.5        bow of i: 20.0        tail of i: 27.0        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
    V_id:  5        li: 8.0        xi: 26.0        bow of i: 22.0        tail of i: 30.0        gama_i0: 4.0        gama_i1: 6
.0        duration_time_i: 2.0        demand_i: 80.0        work load_i: 80.0        work load gap_i: 0
    V_id:  6        li: 9.0        xi: 4.5        bow of i: 0.0        tail of i: 9.0        gama_i0: 10.0        gama_i1: 13.0
          duration_time_i: 3.0        demand_i: 160.0        work load_i: 160.0        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: 13.0        gama_i1: 17.0
          duration_time_i: 4.0        demand_i: 140.0        work load_i: 140.0        work load gap_i: 0
    V_id:  8        li: 7.0        xi: 3.5        bow of i: 0.0        tail of i: 7.0        gama_i0: 1.0        gama_i1: 2.0
          duration_time_i: 1.0        demand_i: 140.0        work load_i: 140.0        work load gap_i: 0
    V_id:  9        li: 8.0        xi: 4.0        bow of i: 0.0        tail of i: 8.0        gama_i0: 17.0        gama_i1: 21.0
          duration_time_i: 4.0        demand_i: 160.0        work load_i: 160.0        work load gap_i: 0
    V_id:  10        li: 5.0        xi: 8.5        bow of i: 6.0        tail of i: 11.0        gama_i0: 6.0        gama_i1:
10.0        duration_time_i: 4.0        demand_i: 160.0        work load_i: 160.0        work load gap_i: 0
    V_id:  11        li: 7.0        xi: 3.5        bow of i: 0.0        tail of i: 7.0        gama_i0: 4.0        gama_i1: 6.0
          duration_time_i: 2.0        demand_i: 80.0        work load_i: 80.0        work load gap_i: 0

Algorithm finished and the total CPU time: 1206 s
End
```