```
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=9263

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_15_3 _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 =  45

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] = 101.56   temp_best_value_gen = 101.56

37      The No. 0  iteration is finished!

38

39  Beging the No. 1  iteration:

40      obj[gen-1] = 101.56    temp_best_value_gen = 101.56

41      No, maintain solution  and obj[gen] = 101.56 , and the tolerance_counter = 1

42      solution chromosome =

43          first level: [ [ 4.91  6.51  5.3   5.28  6.89  6.38  2.4   2.45  4.59  5.71  1.83  2.17

44    6.47  5.83 14.5 ]

45          second level:  [ 6.  0.  4.  1.  2.  7.  9. 11. 15. 19. 21. 25.  8. 29.  2.]

46          third level:  [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.] ]

47      The No. 1  iteration is finished!

48

49  Beging the No. 2  iteration:

50      obj[gen-1] = 101.56    temp_best_value_gen = 101.56

51      No, maintain solution  and obj[gen] = 101.56 , and the tolerance_counter = 2

52      solution chromosome =

53          first level: [ [ 4.91  6.51  5.3   5.28  6.89  6.38  2.4   2.45  4.59  5.71  1.83  2.17

54    6.47  5.83 14.5 ]

55          second level:  [ 6.  0.  4.  1.  2.  7.  9. 11. 15. 19. 21. 25.  8. 29.  2.]

56          third level:  [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.] ]

57      The No. 2  iteration is finished!

58

59  Beging the No. 3  iteration:

60      obj[gen-1] = 101.56    temp_best_value_gen = 101.56

61      No, maintain solution  and obj[gen] = 101.56 , and the tolerance_counter = 3

62      solution chromosome =

63          first level: [ [ 4.91  6.51  5.3   5.28  6.89  6.38  2.4   2.45  4.59  5.71  1.83  2.17

64    6.47  5.83 14.5 ]

65          second level:  [ 6.  0.  4.  1.  2.  7.  9. 11. 15. 19. 21. 25.  8. 29.  2.]

66          third level:  [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.] ]

67      The No. 3  iteration is finished!

68

69  Beging the No. 4  iteration:

70      obj[gen-1] = 101.56    temp_best_value_gen = 101.56

71      No, maintain solution  and obj[gen] = 101.56 , and the tolerance_counter = 4

72      solution chromosome =

73          first level: [ [ 4.91  6.51  5.3   5.28  6.89  6.38  2.4   2.45  4.59  5.71  1.83  2.17

74    6.47  5.83 14.5 ]

75          second level:  [ 6.  0.  4.  1.  2.  7.  9. 11. 15. 19. 21. 25.  8. 29.  2.]

76          third level:  [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.] ]

77      The No. 4  iteration is finished!

78

79  Beging the No. 5  iteration:
```

80 obj[gen-1] = 101.56 temp_best_value_gen = 101.56
81 No, maintain solution and obj[gen] = 101.56 , and the tolerance_counter = 5
82 solution chromosome =
83 first level: [[4.91 6.51 5.3   5.28 6.89 6.38 2.4   2.45 4.59 5.71 1.83 2.17
84 6.47 5.83 14.5]
85 second level: [6. 0. 4. 1. 2. 7. 9. 11. 15. 19. 21. 25. 8. 29. 2.]
86 third level: [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.]]
87 The No. 5 iteration is finished!
88
89 Beging the No. 6 iteration:
90 obj[gen-1] = 101.56 temp_best_value_gen = 101.56
91 No, maintain solution and obj[gen] = 101.56 , and the tolerance_counter = 6
92 solution chromosome =
93 first level: [[4.91 6.51 5.3   5.28 6.89 6.38 2.4   2.45 4.59 5.71 1.83 2.17
94 6.47 5.83 14.5]
95 second level: [6. 0. 4. 1. 2. 7. 9. 11. 15. 19. 21. 25. 8. 29. 2.]
96 third level: [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.]]
97 The No. 6 iteration is finished!
98
99 Beging the No. 7 iteration:
100 obj[gen-1] = 101.56 temp_best_value_gen = 101.56
101 No, maintain solution and obj[gen] = 101.56 , and the tolerance_counter = 7
102 solution chromosome =
103 first level: [[4.91 6.51 5.3   5.28 6.89 6.38 2.4   2.45 4.59 5.71 1.83 2.17
104 6.47 5.83 14.5]
105 second level: [6. 0. 4. 1. 2. 7. 9. 11. 15. 19. 21. 25. 8. 29. 2.]
106 third level: [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.]]
107 The No. 7 iteration is finished!
108
109
110 ---
111 The iteration is terminated and then visulize the solution:
112 solution chromosome =
113 first level: [[4.91 6.51 5.3   5.28 6.89 6.38 2.4   2.45 4.59 5.71 1.83 2.17
114 6.47 5.83 14.5]
115 second level: [6. 0. 4. 1. 2. 7. 9. 11. 15. 19. 21. 25. 8. 29. 2.]
116 third level: [3. 6. 5. 7. 4. 3. 4. 2. 2. 3. 1. 2. 8. 2. 2.]]
117 Objective function values and some other indicators:
118 Obj0 = 31.00 Obj1 = 426.65 Obj0 + Obj1 = 457.65
119 Total movement of crane: 46.65
120 Total waiting time in berth position: 159.00
121 Total index of q during berthing: 248.00
122 Specific arrangement for each vessel:

	V_id	li	xi	bow of i	tail of i	gama_i0	gama_i1
123	0	li: 9.0	xi: 4.9	bow of i: 0.4	tail of i: 9.4	gama_i0: 6.0	gama_i1: 7.0
		duration_time_i: 1.0		demand_i: 60.0	work load_i: 60.0	work load gap_i: 0	
124	1	li: 9.0	xi: 6.5	bow of i: 2.0	tail of i: 11.0	gama_i0: 0.0	gama_i1: 1.0
		duration_time_i: 1.0		demand_i: 80.0	work load_i: 80.0	work load gap_i: 0	
125	2	li: 6.0	xi: 5.3	bow of i: 2.3	tail of i: 8.3	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	
126	3	li: 7.0	xi: 5.3	bow of i: 1.8	tail of i: 8.8	gama_i0: 1.0	gama_i1: 2.0
		duration_time_i: 1.0		demand_i: 100.0	work load_i: 100.0	work load gap_i: 0	
127	4	li: 4.0	xi: 6.9	bow of i: 4.9	tail of i: 8.9	gama_i0: 2.0	gama_i1: 4.0
		duration_time_i: 2.0		demand_i: 140.0	work load_i: 140.0	work load gap_i: 0	
128	5	li: 7.0	xi: 6.4	bow of i: 2.9	tail of i: 9.9	gama_i0: 7.0	gama_i1: 8.0
		duration_time_i: 1.0		demand_i: 60.0	work load_i: 60.0	work load gap_i: 0	
129	6	li: 4.0	xi: 2.4	bow of i: 0.4	tail of i: 4.4	gama_i0: 9.0	gama_i1: 11.0
		duration_time_i: 2.0		demand_i: 100.0	work load_i: 100.0	work load gap_i: 0	
130	7	li: 3.0	xi: 2.5	bow of i: 1.0	tail of i: 4.0	gama_i0: 11.0	gama_i1: 15.0
		duration_time_i: 4.0		demand_i: 140.0	work load_i: 140.0	work load gap_i: 0	
131	8	li: 5.0	xi: 4.6	bow of i: 2.1	tail of i: 7.1	gama_i0: 15.0	gama_i1: 19.0
		duration_time_i: 4.0		demand_i: 160.0	work load_i: 160.0	work load gap_i: 0	
132	9	li: 6.0	xi: 5.7	bow of i: 2.7	tail of i: 8.7	gama_i0: 19.0	gama_i1: 21.0
		duration_time_i: 2.0		demand_i: 120.0	work load_i: 120.0	work load gap_i: 0	
133	10	li: 3.0	xi: 1.8	bow of i: 0.3	tail of i: 3.3	gama_i0: 21.0	gama_i1: 25.0
		duration_time_i: 4.0		demand_i: 80.0	work load_i: 80.0	work load gap_i: 0	
134	11	li: 3.0	xi: 2.2	bow of i: 0.7	tail of i: 3.7	gama_i0: 25.0	gama_i1: 29.0
		duration_time_i: 4.0		demand_i: 160.0	work load_i: 160.0	work load gap_i: 0	
135	12	li: 8.0	xi: 6.5	bow of i: 2.5	tail of i: 10.5	gama_i0: 8.0	gama_i1: 9.0
		duration_time_i: 1.0		demand_i: 160.0	work load_i: 160.0	work load gap_i: 0	
136	13	li: 9.0	xi: 5.8	bow of i: 1.3	tail of i: 10.3	gama_i0: 29.0	gama_i1: 32.0
		duration_time_i: 3.0		demand_i: 100.0	work load_i: 100.0	work load gap_i: 0	
137	14	li: 6.0	xi: 14.5	bow of i: 11.5	tail of i: 17.5	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	

138
139 Algorithm finished and the total CPU time: 1237 s
140 End
141