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=53616

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_17_9 _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 = 51

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] = 73.80   temp_best_value_gen = 73.80

37   The No. 0 iteration is finished!

38

39 Beging the No. 1 iteration:

40   obj[gen-1] = 73.80   temp_best_value_gen = 73.80

41   No, maintain solution and obj[gen] = 73.80 , and the tolerance_counter = 1

42   solution chromosome =

43   first level: [[2.5 7. 13. 20.5 26.5 2.5 3.5 2.5 2.   4.5 3.5 1.5 4.   1.5

44   2.5 3.   1.5]

45   second level: [2. 3. 5. 2. 1. 4. 14. 6. 1. 18. 12. 8. 20. 23. 10. 0. 26.]

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

47   The No. 1 iteration is finished!

48

49 Beging the No. 2 iteration:

50   obj[gen-1] = 73.80   temp_best_value_gen = 72.70

51   Yes, update solution and obj[gen] = 72.70

52   solution chromosome =

53   first level: [[2.5 7. 13. 20.5 3.5 2.5 3.5 2.5 2.   4.5 3.5 1.5 4.   1.5

54   2.5 26.5 1.5]

55   second level: [2. 3. 5. 2. 0. 4. 14. 6. 1. 18. 12. 8. 20. 23. 10. 1. 26.]

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

57   The No. 2 iteration is finished!

58

59 Beging the No. 3 iteration:

60   obj[gen-1] = 72.70   temp_best_value_gen = 72.70

61   No, maintain solution and obj[gen] = 72.70 , and the tolerance_counter = 1

62   solution chromosome =

63   first level: [[2.5 7. 13. 20.5 3.5 2.5 3.5 2.5 2.   4.5 3.5 1.5 4.   1.5

64   2.5 26.5 1.5]

65   second level: [2. 3. 5. 2. 0. 4. 14. 6. 1. 18. 12. 8. 20. 23. 10. 1. 26.]

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

67   The No. 3 iteration is finished!

68

69 Beging the No. 4 iteration:

70   obj[gen-1] = 72.70   temp_best_value_gen = 72.70

71   No, maintain solution and obj[gen] = 72.70 , and the tolerance_counter = 2

72   solution chromosome =

73   first level: [[2.5 7. 13. 20.5 3.5 2.5 3.5 2.5 2.   4.5 3.5 1.5 4.   1.5

74   2.5 26.5 1.5]

75   second level: [2. 3. 5. 2. 0. 4. 14. 6. 1. 18. 12. 8. 20. 23. 10. 1. 26.]

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

77   The No. 4 iteration is finished!

78

79 Beging the No. 5 iteration:

```
 80     obj[gen-1] = 72.70   temp_best_value_gen = 72.70
 81     No, maintain solution  and obj[gen] = 72.70 , and the tolerance_counter = 3
 82     solution chromosome =
 83       first level: [ [ 2.5  7.  13.  20.5 3.5  2.5  3.5  2.5  2.   4.5  3.5  1.5  4.   1.5
 84    2.5 26.5  1.5]
 85       second level:  [ 2.  3.  5.  2.  0.  4. 14.  6.  1. 18. 12.  8. 20. 23. 10.  1. 26.]
 86       third level:  [4. 2. 3. 2. 4. 2. 2. 4. 4. 5. 2. 2. 2. 2. 4. 6. 2.] ]
 87     The No. 5  iteration is finished!
 88
 89  Beging the No. 6  iteration:
 90     obj[gen-1] = 72.70   temp_best_value_gen = 72.70
 91     No, maintain solution  and obj[gen] = 72.70 , and the tolerance_counter = 4
 92     solution chromosome =
 93       first level: [ [ 2.5  7.  13.  20.5 3.5  2.5  3.5  2.5  2.   4.5  3.5  1.5  4.   1.5
 94    2.5 26.5  1.5]
 95       second level:  [ 2.  3.  5.  2.  0.  4. 14.  6.  1. 18. 12.  8. 20. 23. 10.  1. 26.]
 96       third level:  [4. 2. 3. 2. 4. 2. 2. 4. 4. 5. 2. 2. 2. 2. 4. 6. 2.] ]
 97     The No. 6  iteration is finished!
 98
 99  Beging the No. 7  iteration:
100     obj[gen-1] = 72.70   temp_best_value_gen = 72.70
101     No, maintain solution  and obj[gen] = 72.70 , and the tolerance_counter = 5
102     solution chromosome =
103       first level: [ [ 2.5  7.  13.  20.5 3.5  2.5  3.5  2.5  2.   4.5  3.5  1.5  4.   1.5
104    2.5 26.5  1.5]
105       second level:  [ 2.  3.  5.  2.  0.  4. 14.  6.  1. 18. 12.  8. 20. 23. 10.  1. 26.]
106       third level:  [4. 2. 3. 2. 4. 2. 2. 4. 4. 5. 2. 2. 2. 2. 4. 6. 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: [ [ 2.5  7.  13.  20.5 3.5  2.5  3.5  2.5  2.   4.5  3.5  1.5  4.   1.5
114    2.5 26.5  1.5]
115       second level:  [ 2.  3.  5.  2.  0.  4. 14.  6.  1. 18. 12.  8. 20. 23. 10.  1. 26.]
116       third level:  [4. 2. 3. 2. 4. 2. 2. 4. 4. 5. 2. 2. 2. 2. 4. 6. 2.] ]
117     Objective function values and some other indicators:
118     Obj0 = 29.00           Obj1 = 176.00           Obj0 + Obj1 = 205.00
119     Total movement of crane: 21.00
120     Total waiting time in berth position: 155.00
121     Total index of q during berthing: 309.00
122     Specific arrangement for each vessel:
```

	V_id	li	xi	bow of i	tail of i	gama_i0	gama_i1
123	0	li: 5.0	xi: 2.5	bow of i: 0.0	tail of i: 5.0	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		
124	1	li: 4.0	xi: 7.0	bow of i: 5.0	tail of i: 9.0	gama_i0: 3.0	gama_i1: 6.0
		duration_time_i: 3.0	demand_i: 100.0	work load_i: 100.0	work load gap_i: 0		
125	2	li: 8.0	xi: 13.0	bow of i: 9.0	tail of i: 17.0	gama_i0: 5.0	gama_i1: 8.0
		duration_time_i: 3.0	demand_i: 140.0	work load_i: 140.0	work load gap_i: 0		
126	3	li: 7.0	xi: 20.5	bow of i: 17.0	tail of i: 24.0	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		
127	4	li: 7.0	xi: 3.5	bow of i: 0.0	tail of i: 7.0	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		
128	5	li: 5.0	xi: 2.5	bow of i: 0.0	tail of i: 5.0	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		
129	6	li: 3.0	xi: 3.5	bow of i: 2.0	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		
130	7	li: 5.0	xi: 2.5	bow of i: 0.0	tail of i: 5.0	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		
131	8	li: 4.0	xi: 2.0	bow of i: 0.0	tail of i: 4.0	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		
132	9	li: 9.0	xi: 4.5	bow of i: 0.0	tail of i: 9.0	gama_i0: 18.0	gama_i1: 20.0
		duration_time_i: 2.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
133	10	li: 7.0	xi: 3.5	bow of i: 0.0	tail of i: 7.0	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		
134	11	li: 3.0	xi: 1.5	bow of i: 0.0	tail of i: 3.0	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		
135	12	li: 8.0	xi: 4.0	bow of i: 0.0	tail of i: 8.0	gama_i0: 20.0	gama_i1: 23.0
		duration_time_i: 3.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
136	13	li: 3.0	xi: 1.5	bow of i: 0.0	tail of i: 3.0	gama_i0: 23.0	gama_i1: 26.0
		duration_time_i: 3.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0		
137	14	li: 5.0	xi: 2.5	bow of i: 0.0	tail of i: 5.0	gama_i0: 10.0	gama_i1: 12.0
		duration_time_i: 2.0	demand_i: 140.0	work load_i: 140.0	work load gap_i: 0		
138	15	li: 6.0	xi: 26.5	bow of i: 23.5	tail of i: 29.5	gama_i0: 1.0	gama_i1: 2.0
		duration_time_i: 1.0	demand_i: 60.0	work load_i: 60.0	work load gap_i: 0		
139	16	li: 3.0	xi: 1.5	bow of i: 0.0	tail of i: 3.0	gama_i0: 26.0	gama_i1: 30.0
		duration_time_i: 4.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0		

```
140
141  Algorithm finished and the total CPU time: 1316 s
142  End
143
```