```
exe" "D:\Python\Pycharm\setroute\PyCharm Community Edition 2021.2.3\plugins\python-ce\helpers\pydev\pydevconsole.py" --mode=client --port=11982
3
   import sys; print('Python %s on %s' % (sys.version, sys.platform))
   01_My_Python_Code'])
6
  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
8
  python code/01_My_Python_Code')
10 Backend TkAgg is interactive backend. Turning interactive mode on.
   Waiting 1s.....
12
13
  This is the R_2_1 _standard_test.xlsx optimization process solved by ENSGA-II algorithm.
14
15
   Start
16
17
   Before iteration:
18
     Read basic data
19
     Parameter setting:
       trail = 32
20
21
       Pop\_size = 30
       Tolerance iteration unchanged number = 8
23
       Chrom\_size = 6
24
       Iter_num_GA = 300
25
       Select_rate = 0.85
26
       Crossover rate = 0.9
       Mutation rate = 0.9
27
28
       Mu_oper_type = 2
29
       vessel\_move\_way = 1
30
       coefficient for Obj1= 1.0
       coefficient for Obj2= 1.0
31
       gen = 0
32
33
   Iteration begin:
34
35
   Beging the No. 0 iteration:
     obj[0] = 11.80 temp_best_value_gen = 11.80
36
37
     The No. 0 iteration is finished!
38
39
   Beging the No. 1 iteration:
40
     obj[gen-1] = 11.80 temp_best_value_gen = 10.58
     Yes, update solution and obj[gen] = 10.58
41
     solution chromosome =
42
43
       first level: [ [2.41 4.05]
       second level: [2. 0.]
44
       third level: [3. 5.]]
45
     The No. 1 iteration is finished!
46
47
48
   Beging the No. 2 iteration:
     obj[gen-1] = 10.58 temp_best_value_gen = 6.64
49
50
     Yes, update solution and obj[gen] = 6.64
51
     solution chromosome =
52
       first level: [ [2.26 5.01]
53
       second level: [1. 0.]
54
       third level: [2. 8.]]
55
     The No. 2 iteration is finished!
56
57
   Beging the No. 3 iteration:
58
     obi[gen-1] = 6.64 temp best value gen = 6.64
59
     No, maintain solution and obj[gen] = 6.64, and the tolerance_counter = 1
60
     solution chromosome =
61
       first level: [ [2.26 5.01]
62
       second level: [1. 0.]
       third level: [2. 8.]]
63
     The No. 3 iteration is finished!
64
65
   Beging the No. 4 iteration:
66
67
     obj[gen-1] = 6.64 temp_best_value_gen = 6.64
68
     No, maintain solution and obj[gen] = 6.64, and the tolerance_counter = 2
69
     solution chromosome =
70
       first level: [ [2.26 5.01]
       second level: [1. 0.]
71
       third level: [2. 8.]]
73
     The No. 4 iteration is finished!
74
75
   Beging the No. 5 iteration:
     obi[gen-1] = 6.64 temp best value gen = 6.37
76
     Yes, update solution and obj[gen] = 6.37
77
     solution chromosome =
78
       first level: [ [2.05 4.01]
```

```
second level: [0, 2,]
 80
 81
          third level: [4. 8.]]
 82
       The No. 5 iteration is finished!
 83
     Beging the No. 6 iteration:
 85
       obj[gen-1] = 6.37 temp best value gen = 6.37
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 1
 86
 87
        solution chromosome =
 88
          first level: [ [2.05 4.01]
 89
          second level: [0. 2.]
 90
          third level: [4. 8.]]
 91
       The No. 6 iteration is finished!
 92
 93 Beging the No. 7 iteration:
 94
        obj[gen-1] = 6.37 temp_best_value_gen = 6.37
 95
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 2
 96
       solution chromosome =
 97
          first level: [ [2.05 4.01]
 98
          second level: [0. 2.]
 99
          third level: [4. 8.]]
100
       The No. 7 iteration is finished!
101
102 Beging the No. 8 iteration:
103
       obj[gen-1] = 6.37 temp best value gen = 6.37
104
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 3
105
        solution chromosome =
          first level: [ [2.05 4.01]
106
          second level: [0. 2.]
107
          third level: [4. 8.]]
108
109
       The No. 8 iteration is finished!
110
111 Beging the No. 9 iteration:
112
        obj[gen-1] = 6.37 temp_best_value_gen = 6.37
113
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 4
       solution chromosome =
114
115
          first level: [ [2.05 4.01]
116
          second level: [0. 2.]
          third level: [4, 8,]]
117
118
       The No. 9 iteration is finished!
119
120 Beging the No. 10 iteration:
121
       obj[gen-1] = 6.37 temp_best_value_gen = 6.37
122
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 5
123
        solution chromosome =
124
          first level: [ [2.05 4.01]
125
          second level: [0. 2.]
126
          third level: [4. 8.]]
127
       The No. 10 iteration is finished!
128
129 Beging the No. 11 iteration:
130
        obj[gen-1] = 6.37 temp_best_value_gen = 6.37
131
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 6
132
       solution chromosome =
133
          first level: [ [2.05 4.01]
134
          second level: [0. 2.]
135
          third level: [4. 8.]]
136
       The No. 11 iteration is finished!
137
138 Beging the No. 12 iteration:
139
       obj[gen-1] = 6.37 temp_best_value_gen = 6.37
140
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 7
141
        solution chromosome =
142
          first level: [ [2.05 4.01]
          second level: [0. 2.]
143
          third level: [4. 8.]]
144
145
       The No. 12 iteration is finished!
146
147 Beging the No. 13 iteration:
148
        obj[gen-1] = 6.37 temp_best_value_gen = 6.37
149
       No, maintain solution and obj[gen] = 6.37, and the tolerance_counter = 8
150
       solution chromosome =
151
          first level: [ [2.05 4.01]
152
          second level: [0. 2.]
153
          third level: [4. 8.]]
154
       The No. 13 iteration is finished!
155
156
157
158 The iteration is terminated and then visulize the solution:
159
       solution chromosome =
160
          first level: [ [2.05 4.01]
          second level: [0. 2.]
161
162
          third level: [4. 8.]]
        Objective function values and some other indicators:
163
```

64	$\frac{\text{wn}}{\text{Obj0} = 2.00}$	Obj1 = 4.37	Obj0 + Obj1 = 6.37			
65	Total movement of		Obj0 + Obj1 = 0.37			
66	Total waiting time in berth position: 2.00					
67	Total index of q during berthing: 27.00					
68						
69	V_id: 0	li: 4.0	xi: 2.1 bow of i: 0.1	tail of i: 4.1	gama_i0: 0.0	gama_i1: 2.0
	duration	n_time_i: 2.0	demand_i: 160.0	work load_i: 160.0	work load gap_i: 0	
70	V_id: 1	li: 8.0	xi: 4.0 bow of i: 0.0	tail of i: 8.0	gama_i0: 2.0	gama_i1: 3.0
	duration	n_time_i: 1.0	demand_i: 120.0	work load_i: 120.0	work load gap_i: 0	
71						
	Algorithm finished and the total CPU time: 454 s					
	End					
74						