

[Advanced Algorithms]

Lab2- Minimum Mean Cycle

Due: 2017/05/17

Note:

You have to change the compiler using the command line `$GCC46`

1 Problem Formulation

Give a directed graph $G(V, E)$ and w_e denotes the weight of edge e . For each cycle $c_i \in G$,

$$w_{c_i} = \sum_{e \in c_i} \frac{w_e}{|c_i|}, \quad (1)$$

where $|c_i|$ is the number of edges of c_i . The minimum mean cycle problem is to find the minimum w_c^* so that $\forall c_i \in G, w_{c_i} \geq w_c^*$.

2 Input/Output Format

2.1 Input Format

- Each case is a directed graph.
- The first line defines the number of nodes and the number of edges.
- In the following each line, an edge is defined by a from node, a to node, and a weight.
- Figure 1 gives an example.

2.2 Output Format

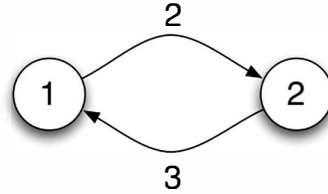
- **Your output file must be named by “solution.txt”!**
- If there is a cycle in the graph (example of Figure 2(a)),
 - Write the value of minimum mean cycle in the first line.
 - Write nodes traversing along the cycle in the second line. (2 1 2 is also a correct answer in Figure 2(a))
- If there is no cycle, (example of Figure 2(b))
 - Write “No cycle” in the first line.

```

2 2      //num_of_nodes num_of_edges
1 2 2    //weight of directed edge(1->2) is 2
2 1 3    //weight of directed edge(2->1) is 3

```

(a) Text Format



(b) Graph Illustration

Figure 1: Input format (cycle.1.in)

```

2.50    //value of minimum mean cycle
1 2 1    //the cycle

```

(a) A cycle exists in graph

No cycle

(b) No cycle

Figure 2: Output format

3 Evaluation

Your lab will be demoed by the following steps:

1. Enter into your lab directory. (Please use the following path as your lab directory:
/your_root_directory/Lab2/src/)
2. `$ rm solution.txt Lab2`
3. `$ make clean`
4. `$ make`
5. `$./Lab2 <bench.in>` (Run time is limited by 30 seconds.)

3.1 Reference Solution

- An executable `ref` file is provided for your reference. Follow the usage, it will generate the reference solution for `<bench.in>`.
- Usage: `./ref <bench.in>`