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Homework 9: Implement graph algorithms with GridGraph

This shows How to run and the gathered results:

```
2019280513@bd-node1:~/hw9$ make
...
2019280513@bd-node1:~/hw9$ ./bin/preprocess -i /data/hw9/livejournal -o data -v 4847571 -p 4 -t 0
vertices = 4847571, edges = 68993773
8.748921 -> 8.748931 (0)
it takes 8.75 seconds to generate edge blocks
column oriented grid generated
row oriented grid generated
it takes 10.77 seconds to generate edge grid
2019280513@bd-node1:~/hw9$ ./bin/conductance data 10 4
Results
----------------------
Red Edges: 34557769
Other Edges(Black): 34436004
Crossover Edges: 34507384
Conductance: 1
Total time: 0.42 seconds.
2019280513@bd-node1:~/hw9$ ./bin/pagerank_ddf data 10 4
degree calculation used 0.36 seconds
0        29.740620
1        97.289772
2        53.486794
3        39.232311
4        45.357552
5        28.488358
6        64.081635
7        27.611629
8        15.779602
9        33.350849
--------------------------
Result: 10 PageRank Iterations ->  3.82 seconds
```

In my assignment I have chosen to implement Delta PageRank and Conductance . The given "hw9 additional material" was really helpful as a reference to build these 2 algorithms.

Conductance

For the conductance I simply followed the formula and given in the file and the Wikipedia explanation was a good help too. For the random walks, with a long history in the usage of the term "conductance" I have used the %2 operator to randomize the edges to find black or red edges.

After that I have applied this formula below to gather the conductance:

$$conductance = \frac{\#\ crossover\ edges}{\min\{|\#\ red\ edges|, |\#\ black\ edges|\}}$$

Conductance Results:

```
2019280513@bd-node1:~/hw9$ ./bin/conductance data 10 4
Results
----------------------
Red Edges: 34557769
Other Edges(Black): 34436004
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Conductance: 1
Total time: 0.42 seconds.
```

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Delta PageRank

For the Delta PageRank since it was really similar to normal PageRank it wasn't hard to implement I have strictly just followed the "hw9 additional material" file.
It only updates the vertices which PageRank value has changed by
more than some delta fraction as stated in the given file (in the x-stream code, the variable is called propagation threshold) .Just followed the formula and got the results below.

$$Rank(A) = Rank(A) + Delta(A)$$

$$Delta(A) = 0.85 * (\frac{Delta(B)}{L(B)} + \frac{Delta(C)}{L(C)} + \dots)$$

Delta PageRank Results:

```
2019280513@bd-node1:~/hw9$ ./bin/pagerank_ddf data 10 4
degree calculation used 0.36 seconds
0         29.740620
1         97.289772
2         53.486794
3         39.232311
4         45.357552
5         28.488358
6         64.081635
7         27.611629
8         15.779602
9         33.350849
---------------------------
Result: 10 PageRank Iterations ->  3.82 seconds
```

References:

https://en.wikipedia.org/wiki/Conductance_(graph)