15-400 Project Milestone Report 2

Amulya Musipatla (amusipat)

January 30, 2019

1 Milestone outlined in report

Read more papers about directed graph streaming algorithms as well as problems involving less than n space to gain more intuition and learn about methods we could use for this problem.

2 Current Progress

2.1 Accomplishments:

Over the break I kept in contact with Professor Woodruff, and we talked more about the easier instances of this problems. To understand these easier instances more, we are trying to find some characteristic that applies to them. In particular, we looked at stars, and how we could easily identify a star with streamed edges.

To come up with this algorithm, I had to learn more about subsampling, the L0 algorithm, universal hashing, and estimating a Euclidean norm with a CountSketch algorithm. We talked about the bounds for this proposed algorithm, and I typed up a formal explanation and proof of correctness for this algorithm, and looked for ways to make our claim and bounds stronger.

2.2 Meeting my milestone:

Throughout this process, I've had to read more papers on these common graph streaming algorithms, and I think I've gained more intuition on approaching these types of problems.

2.3 Looking Ahead:

Next Milestone: Make observations about difficult instances and easy instances: what characterizes them, can we adapt the algorithms we already have for easy instances to work for harder ones?

I've already gotten started on this milestone, and throughout the next two weeks I'm looking to see if our method of focusing on the vertex covers can be generalized to other instances, and if we can differentiate between graphs based on the size of their vertex cover. This would help us generalize our method of identifying graphs, which could help us when we have harder instances.

2.4 Changes/Surprises/Revisions/Resources Needed:

None