15-400 Project Milestone Report 1

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1 Milestone outlined in report

In order to prepare for research in this field next semester, I need to get up to date with common graph streaming algorithms and methods used. To solidify my knowledge here and gain more intuition, I hope to get more familiar with reductions in graph streaming and come up with some reductions to the problem we are focusing on.

2 Current Progress

2.1 Accomplishments:

To prepare for research next semester, I mostly focused on learning more about graph streaming about this problem in general. In particular, I first read over what I learned about graph streaming and the problems that we talked about in 15-451 to refresh my mind on the subject. I then read the papers outlined by Professor Woodruff about graph streaming [1][2][3]. I've also watched videos about common graph streaming algorithms and on algorithms that deal with analyzing bigger graphs that encompass a lot of data via sketching and streaming. Reading these survey papers has helped me learn more about graph streaming in general, giving me a good place to start when approaching root finding with streaming.

So far, we have discussed briefly about what make certain instances of the problem easier than others. For example, we talked about why stars and paths seem to be easier instances of the problem, and whether adding randomness to these instances greatly alters the difficulty. We've also talked about L0 sampling and how we could potentially use this problem to think about bounds and reductions for root finding, so I researched more about this so get ready for next semester.

2.2 Meeting my milestone:

I feel more confident about the material and subject content than before, though I could still benefit from attempting different reductions. Over the break, I hope to continue this research and to continue looking into similar problems so that I can gain more intuition on tree streaming and root finding specifically. This ties into the second milestone goal outlined in my project proposal.

2.3 Changes/Surprises/Revisions/Resources Needed:

None

References

[1] Ahn, Kook Jin, et al. Analyzing Graph Structure via Linear Measurements. *Proceedings of the Twenty-Third Annual ACM-SIAM Symposium on Discrete Algorithms*, 2012, pp. 459467., doi:10.1137/1.9781611973099.40.

[2] Feigenbaum, Joan, et al. Graph Distances in the Data-Stream Model. *SIAM Journal on Computing*, vol. 38, no. 5, 2009, pp. 17091727., doi:10.1137/070683155.

[3] Mcgregor, Andrew. Graph Stream Algorithms. *ACM SIGMOD Record* vol. 43, no. 1, 2014, pp. 920., doi:10.1145/2627692.2627694.