CS 292F.300 Final project proposal

Daniel Zhang

TOTAL POINTS

1 / 1

QUESTION 1

1 Proposal submitted 1 / 1

✓ **- 0 pts** **Correct**

This sounds great. I look forward to reading it.

CS 292F.300 S21 Final Project Proposal

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For the final project, I would like to investigate the fast algorithms for solving Laplacian linear systems and applications to algorithm design.

I will first try to understand the algorithm and analysis in "Approximate Gaussian Elimination for Laplacians: Fast, Sparse, and Simple" (Kyng and Sachdeva 2018).

I may also look at other fast solvers such as "Almost-linear-time algorithms for Markov chains and new spectral primitives for directed graphs" (Cohen et al) or "Derandomization Beyond Connectivity: Undirected Laplacian Systems in Nearly Logarithmic Space" (Murtagh et al 2017). I'm also considering the data structure in "Fully dynamic spectral vertex sparsifiers and applications" (Durfee et al 2019).

I will then look at recent papers that describe algorithms that use fast Laplacian linear solvers to achieve their fast running time and try to understand how the solvers are being used.

Some papers I am considering are "An almost-linear time algorithm for uniform random spanning tree generation" (Schild 2018) and "Flows in almost linear time via adaptive preconditioning" (Kyng et al 2019).

(I probably won't get to all of them.)

For the deliverable, I will write a survey paper that explains the concepts behind the algorithms and their analysis to a graduate student.

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✓ **- 0 pts Correct**

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