CSC299 Project Proposal

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2017.06.06

Title

Parallel ways to shortest-paths problem

Summary

I plan to parallelize and implement algorithms which is related to single source shortest path problem. If time permits, I would also do some work on all pair shortest path problem. Moreover, I will analyze the performance of these algorithms in details and contrast them with serial versions.

Background and challenge

With the development of graphics card, I hope to use Nvidia CUDA platform to improve the performance of the Bellman-Ford algorithm and Dijstra's algorithm. Both two algorithms are useful in single-source shortest path problem. However, it becomes difficult when implementing them in parallel. Dijstra's algorithm is sequential in itself because of the greedy strategy. ALso, it is hard to optimize Bellman-Ford algorithm to make the most of GPU hardware.

Schedule

The scheduel corresponds to the different parts of final report.

Week	Plan
Jun 9-15	Familiar with background and recent work Implement Bellman-Ford algorithm and Dijstra's algorithm
Jun 16-22	Parallelize serial algorithms
Jun 23-29	Prove the correctness of parallel verison algorithms Predict the performance on GPU
Jun 30-Jul 6	Implement the algorithms on GPU with CUDA
Jul 7-13	Analyze performance characteristics Contrast the performance with serial version
Jul 14-20	Improve parallel algorithms Review GPU exexution model and memory model
Jul 21-27	Optimize the implementation
Jul 28-Aug 3	Review all process and draw conclusions
Aug 4-10	Write report and prepare for presentation
Aug 11-15	Final report and presentation