Milestone Report

Lucas Wu, Katrina Hu

URL (Project Website)

https://katrina0406.github.io/parallel_astar_search/

Work Completed

We've finished setting up our sequential codebase of A* search with corresponding benchmarks to test the correctness and performance of code. We've also finished implementing HDA* parallel graph search algorithm with MPI based on this sequential codebase and have tested that the output path is the correct optimal path.

Work To Do

Currently our HDA* search has some performance issue, in that it seems not to fully utilize the parallel power and doesn't show the expected improvement.

- Our runtime performance of HDA* is currently similar to that of sequential A*, and we need to figure out how to improve this performance. Our current guess is that the workload is too imbalanced across processors.
- When running multiple trials together, we sometimes would encounter message truncated error from MPI. Our current guess is that we should implement MPI_cancel to ensure no pending messages are sent via MPI but are not received on the other end.

Updated Goals and Deliverables

Goals

- Finish implementing HDA* and achieve a comparable speedup with the original paper.
- Finish implementing another version of parallel search (GA* or OpenMP).

Deliverables

- Speedup graphs compared to sequential version of A* search.
- Plots on the communication overhead and work overhead.
- Potentially some ablations..
- Analysis report for how the algorithm is parallelized and what can be improved.

Updated Schedule

Dec 4 - Dec 10

- Finish implementing HDA* search using MPI
    - Modify Hash Function to address load imbalance issue - *Lucas*
    - Write MPI_Cancel to address message truncation issue - *Katrina*
    - Test and further improve performance - *Lucas, Katrina*
- Fun experiments and ablations - *Lucas, Katrina*
- Implement another version of parallel A* search - *Lucas, Katrina*
- Write Final Project Report - *Lucas, Katrina*

Dec 11 - Dec 14

- Wrap up the other version of parallel A* search - *Lucas, Katrina*
- Wrap up Final Project Report
    - Update project website - *Katrina*
    - Wrap up pdf report - *Lucas, Katrina*

Concerned Issues

- We are not sure if modifying our hash function for assigning work to processors would in fact address our performance issue of HDA* search.
- We are not entirely confident that our logic is completely correct at this moment and may need to further examine and test it.