LITERATURE REVIEW: Re-implementation and Analysis of p-Stepping Algorithms for Parallel Shortest Paths

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1 Motivation(1 page)

- What is SSSP?
- Why SSSP is important?
- Why we need parallelize SSSP?

2 Problem Formulation(1-2 pages)

- The input format
- The output format

3 Background(2-3 pages)

- Dijkstra[3] and Bellmanford[1]
- $\Delta - stepping$[7]
- Radius-stepping [2]

4 Approach (2-3 pages)[4]

- Overview of the algorithm framework
- The stepping algorithm
- LaB-PQ(Lazy-Batched Priority Queue)

5 Evaluation(2-3 pages)

- Datasets used: Twitter(TW)[5], Road USA(USA)[8],amazon0601[6], wiki-Vote[6]
- Graphs result for each algorithm
- Table result for each algorithm

6 Conclusion(2-3 pages)

- Soundness
- Novelty
- Limitation

References

[1] Richard Bellman. On a routing problem. *Quarterly of applied mathematics*, 16(1):87–90, 1958.

[2] Guy E Blelloch, Yan Gu, Yihan Sun, and Kanat Tangwongsan. Parallel shortest paths using radius stepping. In *Proceedings of the 28th ACM Symposium on Parallelism in Algorithms and Architectures*, pages 443–454, 2016.

[3] Edsger W Dijkstra et al. A note on two problems in connexion with graphs. *Numerische mathematik*, 1(1):269–271, 1959.

[4] Xiaojun Dong, Yan Gu, Yihan Sun, and Yunming Zhang. Efficient stepping algorithms and implementations for parallel shortest paths. *arXiv preprint arXiv:2105.06145*, 2021.

[5] Haewoon Kwak, Changhyun Lee, Hosung Park, and Sue Moon. What is twitter, a social network or a news media? In *Proceedings of the 19th international conference on World wide web*, pages 591–600, 2010.

[6] Jure Leskovec and Andrej Krevl. SNAP Datasets: Stanford large network dataset collection, June 2014.

[7] Ulrich Meyer and Peter Sanders. δ-stepping: a parallelizable shortest path algorithm. *Journal of Algorithms*, 49(1):114–152, 2003.

[8] OpenStreetMap contributors. Planet dump retrieved from https://planet.osm.org . URL https://www.openstreetmap.org , 2017.