Presentation Outline: Parallel Algorithms for Centrality in Dynamic Graphs

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Slide Topics:

1. Introduction
   - Introduction to the project
2. Betweenness Centrality
   - Brief definition of betweenness centrality
3. Where/Why is Betweenness Centrality Used?
   - Practical applications, where it is used
4. Calculating Betweenness Centrality
   - Overview of the fundamental Brandes Algorithm
   - Why it is important for dynamic graphs
5. Brandes' - Breadth-first Search (BFS)
   - Animated example of the values calculated during the BFS step of Brandes
6. Brandes' – Reverse Breadth-first Search (R-BFS)
   - Animated example of the values calculated during the R-BFS step of Brandes
7. Betweenness Centrality in Dynamic Graphs
   - Brief overview, of how an edge update affects betweenness centrality
   - Real world applications
8. Calculating Betweenness Centrality in Dynamic Graphs
   - Introduction to Shukla et al.'s cutting-edge algorithm and its key concepts
     - Avoid BFS by using biconnected components
     - Using previous data stored from BFS/R-BFS
     - Computing betweenness centrality for a batch of edges
9. Biconnected Components:
   - Discuss how identifying biconnected components leads to less BFS and further parallelization
     - Discuss that re-computing the betweenness centrality within just the affected biconnected component is enough

10. Updating Edges in Batches

- Discuss how a batch of updates can be applied rather than recomputing the betweenness centrality after each edge insertion/deletion

11. Parallelized Betweenness Centrality Calculation (x3 – likely 3 slides)

- Animated example of calculating Betweenness Centrality using Shukla et al.'s algorithm and how the theory discussed above is applied
- Explanation of how the algorithm is parallelized to improve performance

12. Parallel Performance

- Discuss how the performance is with multiple processors

13. Comparison of Results with Literature

- On the same datasets
- On different datasets

14. References

- Reference any images used
- Reference papers discussed