Graph Drawing

Calvin Bulla
Enrique Díaz Roque

January 18, 2017

Algorithms for VSLI

1. Where (class topic) Global and detailed placement Force directed placement (class theory)
2. Our setup
3. Graph drawing
4. Initial position
5. Iterative process
6. Forces
7. Repulsive
8. Spring
9. Parallelism
10. Experiments modifying functions (forces)
11. Experiments scaling topology
12. Experiments convergence
13. Extensions (clustering, optimizations, details that we didn't have time to implement (but we liked), . . .)
14. Conclusion

Initial positioning

$$A = \begin{pmatrix} 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 1 & 1 & 0 \end{pmatrix}$$

Initial positioning

$$D = \begin{pmatrix} 2 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 \\ 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 2 \end{pmatrix}$$

Initial positioning

Unnormalized Laplacian matrix associated with A

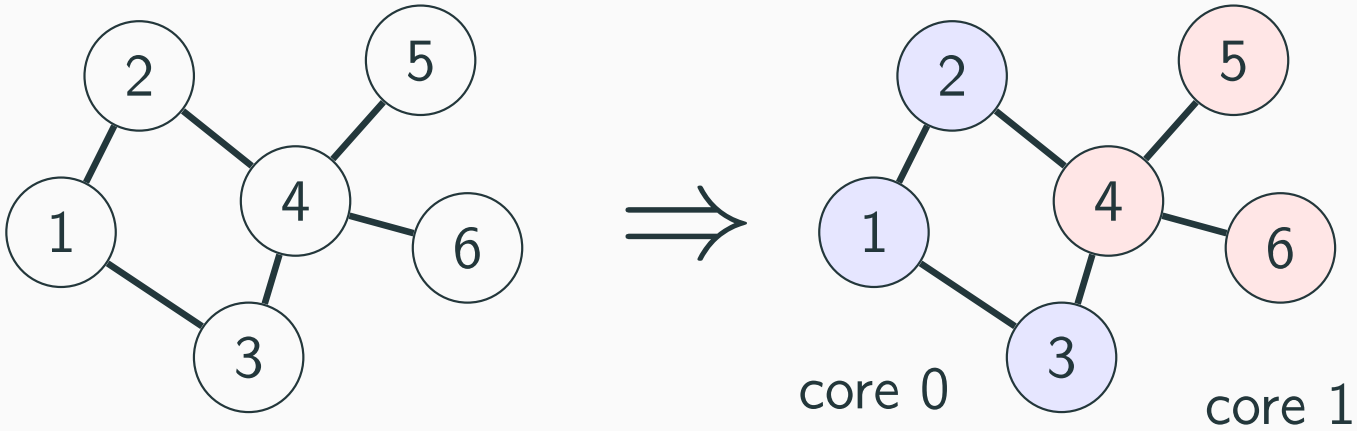
$$L = D - A = \begin{pmatrix} 2 & -1 & -1 & 0 \\ -1 & 2 & 0 & -1 \\ -1 & 0 & 2 & -1 \\ 0 & -1 & -1 & 2 \end{pmatrix}$$

Extensions/Optimizations

Embarassingly parallel algorithm:

- Double buffering (no read/write conflicts)
- Independent computation for each node

$\Rightarrow$ Split work between multiple cores (shared memory)



Extensions/Optimizations

Clustering. . .

References


Chris Walshaw, *A multilevel algorithm for force-directed graph ssdrawing*, International Symposium on Graph Drawing, Springer, 2000, pp. 171–182.