Distributed MST in Core-Periphery Networks

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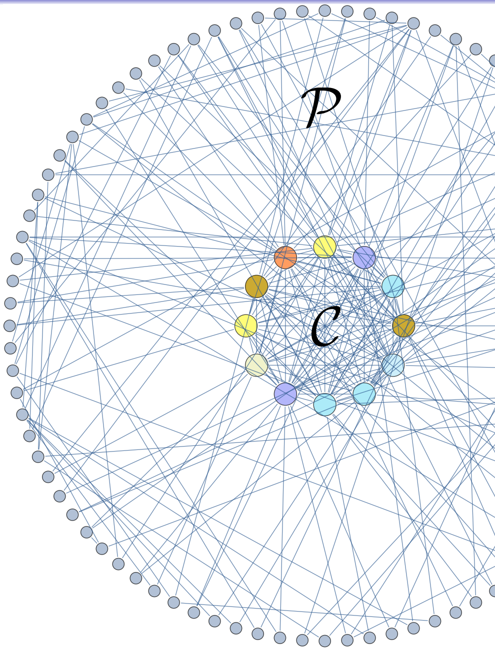
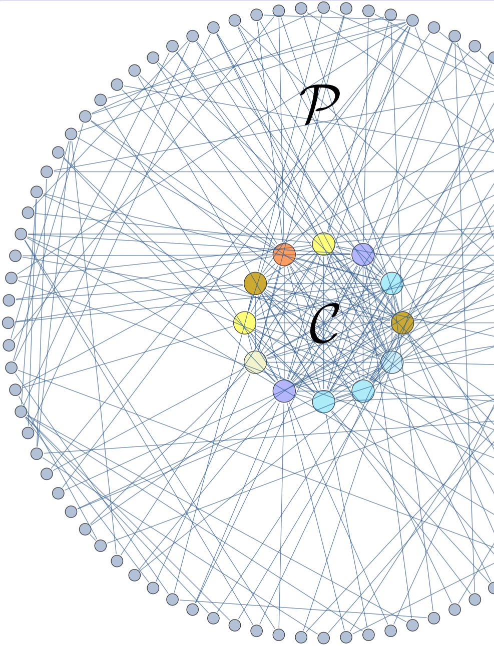
Motivation - Social Networks Structure

- Core (or Elite) - a *small* group of *influential*, and *well connected* individuals.
- Observed in different real-world networks (empirical study)



Core-Periphery Axioms: A1, A2, A3, A4



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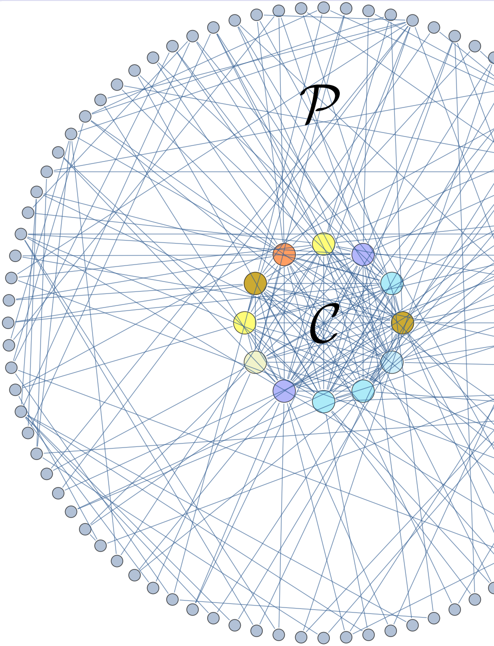
A1. High *Core* Influence.

- $\sum_{v \in \mathcal{C}} d_{\text{out}}(v) = \Omega(m)$



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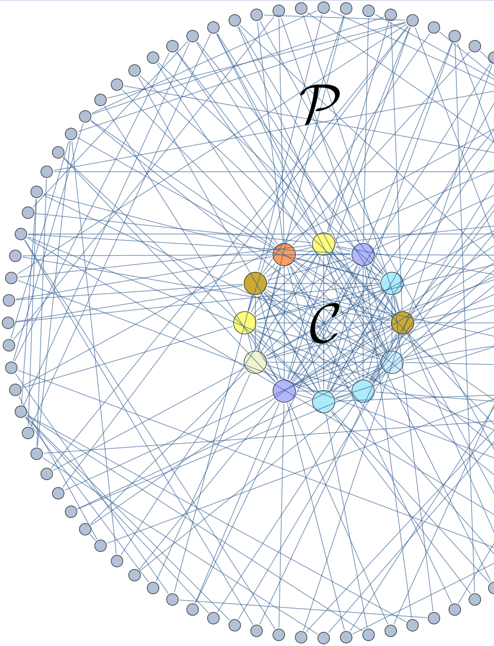

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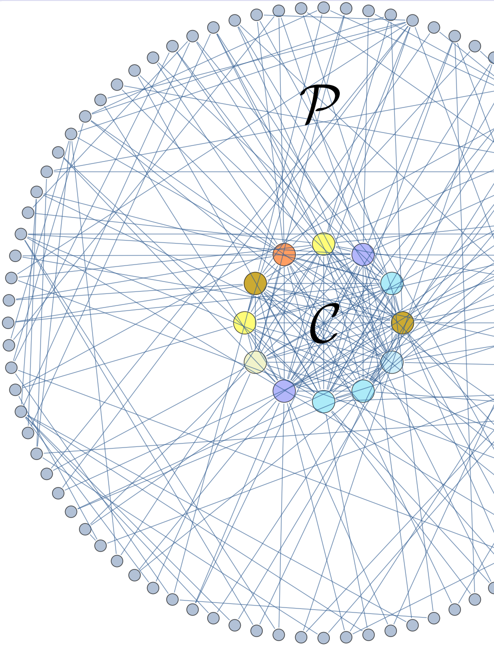
A3. *Core* Clique Emulation.

- $\mathcal{C} \xleftrightarrow{\text{all-to-all}} \mathcal{C}$, in $O(1)$



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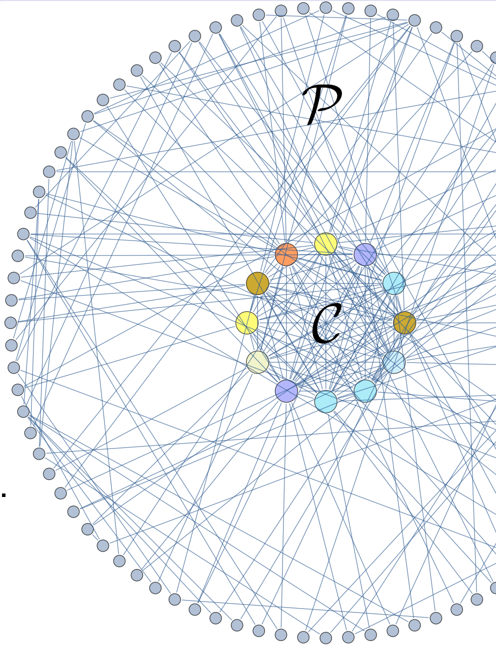
A4. *Periphery-Core* Convergecast.

- $\mathcal{P} \xrightarrow{\text{all-to-any}} \mathcal{C}$, in $O(1)$



Distributed Minimum Spanning Tree ($\mathcal{CONGEST}$ model)

- Complete graph

  $D = 1$: $O(\log \log n)$

  Z. Lotker, B. Patt-Shamir, E. Pavlov, D. Peleg, 2005

- $D = 2$: $O(\log n)$

  $D \geq 3$: $\Omega(\sqrt[3]{n})$

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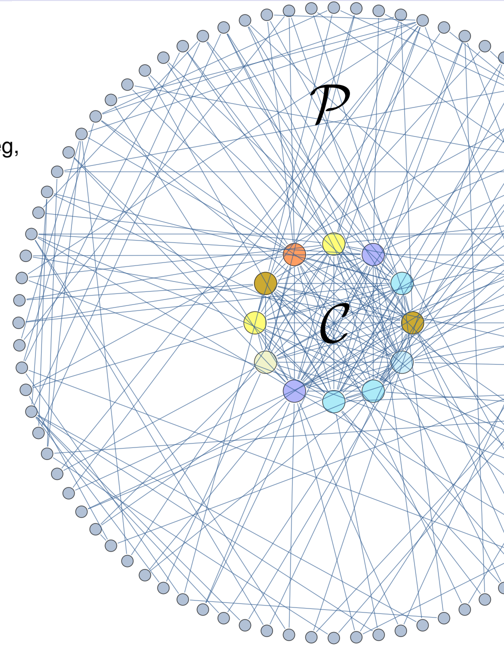

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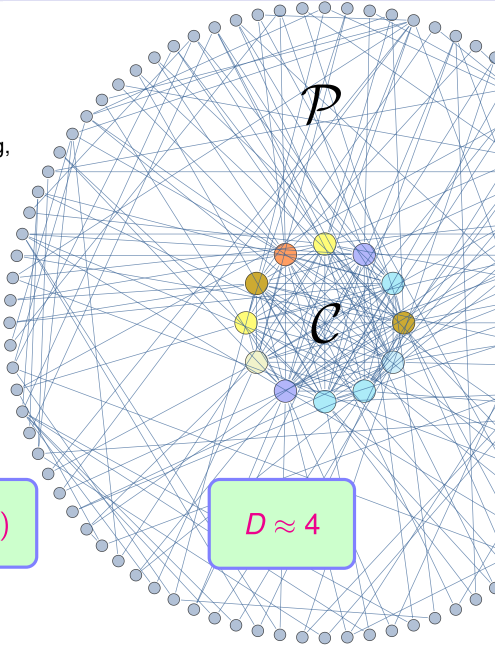
$\mathcal{CP}$-MST algorithm: $O(\log^2 n)$



$D \approx 4$

Summary

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THANK YOU!