Reducing Controversy by Connecting Opposing Views

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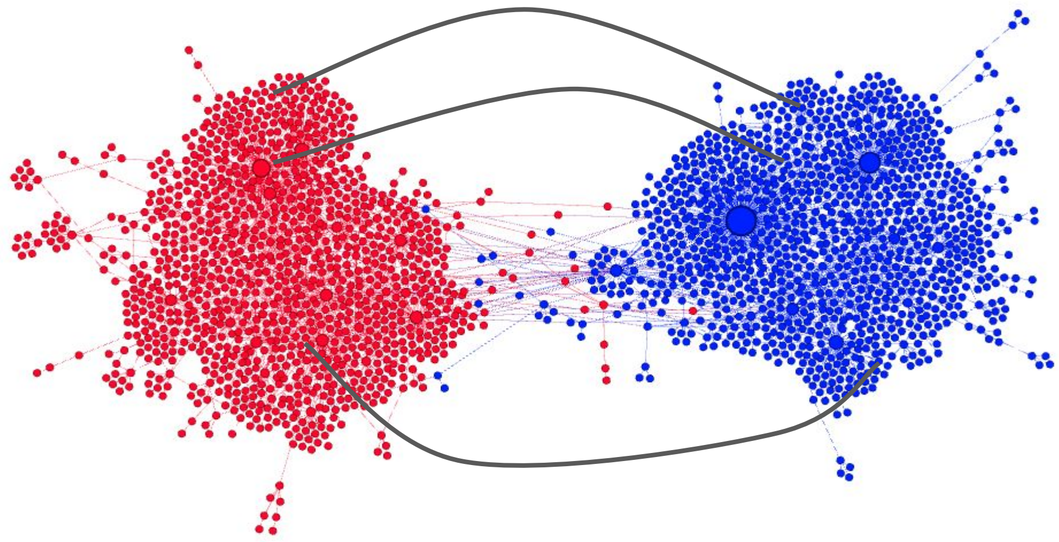
A demo of this research is available at: https://users.ics.aalto.fi/kiran/reducingControversy

1. Motivation

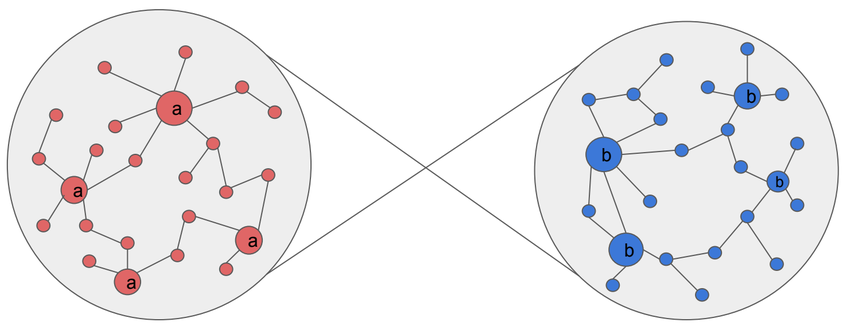
- Increasing Polarization on social media
- Echo chambers
- Filter bubbles



2. Setting

- Twitter
- Retweets
- Endorsement graph
- Directed, topic-specific

3. Objective Function



RWC = ∑ (pagerank of *a* - pagerank of *b*, when we start from side 1) + ∑ (pagerank of *b* - pagerank of *a*, when we start from side 2)

Difference of the probability that a random walk starting on one side of the partition will stay on the same side and the probability that the random walk will cross to the other side.

4. Problem

- add *k* edges to minimize RWC score
- edge (*u*, *v*) ⟶ suggest *user v* to *user u* for this topic

5. Algorithms

- Greedy - $O(n^2)$
- Add edges between high degree nodes (ROV) - $O(p^2)$, $p \ll n$
- ROV + Acceptance Probability

6. Acceptance Probability

- an edge won't always get accepted we model probability of acceptance based on node polarity
- *p(u, v) = p(edge is present | polarity of u, polarity of v)*
- Estimated using: $N_{endorsed}(R_u, R_v)/N_{exposed}(R_u, R_v)$

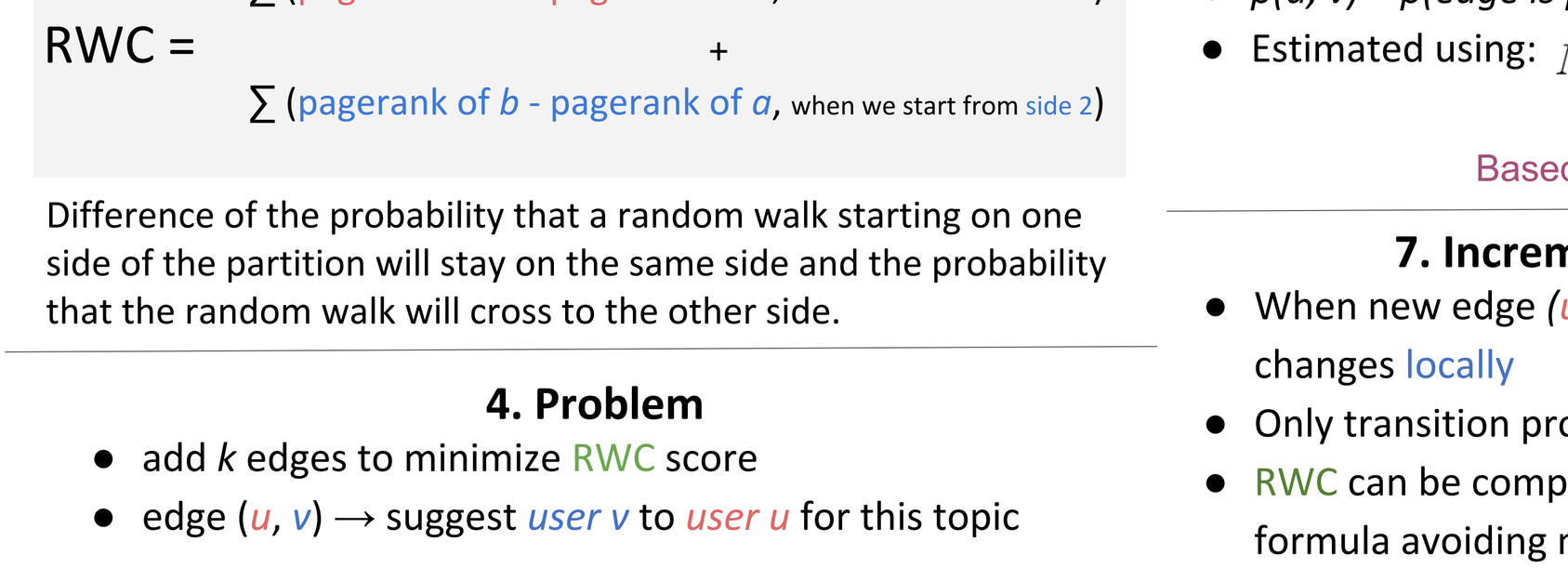
Based on retweets — Based on connections

7. Incremental RWC Computation

- When new edge *(u,v)* is added, the endorsement graph changes locally
- Only transition probabilities from *u* change
- RWC can be computed incrementally by Sherman-Morrison formula avoiding matrix inversion

8. Experiments

- Comparison with other edge-addition approaches



- Example edges added

	obamacare	
	vertex1	vertex2
ROV	mittromney	barackobama
	realdonaldtrump	truthteam2012
	barackobama	drudge_report
	barackobama	paulryanvp
	michelebachmann	barackobama
ROV-AP	kksheld	ezraklein
	lolgop	romneyresponse
	irritatedwoman	motherjones
	hcan	romneyresponse
	klsouth	dennisdmz

9. Acknowledgements

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