SIGNED INTERACTION NETWORKS REVEAL DYNAMICS OF POLARIZATION IN ONLINE DISCUSSIONS

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How do users of online media polarize?

DERSTANDARD

We approach this question using a **novel large scale dataset**, derived from the discussion forums of a major German-speaking news platform. Crucially, we have information on many interactions between users that consist in **up- or down votes** in each other's postings, which allows us to build **temporally finegrained** networks of **signed edges** and **user nodes**.

We focus on debates surrounding:
- The highly contentious European refugee crisis *(2015-16)*
- A notoriously turbulent year regarding corruption scandals which led to the Austrian government collapsing *(2019)*
-The months comprising the start of the COVID-19 pandemic *(2020)*

RQ0: **How can we quantify polarization in online discussions?**

RQ1: **How external social and political context relate to polarization?**

RQ2: **What mechanisms drive polarization fluctuations in this platform?**

Methods

↓ Frustration
↑ Balance == Polarization

Frustrated edge count

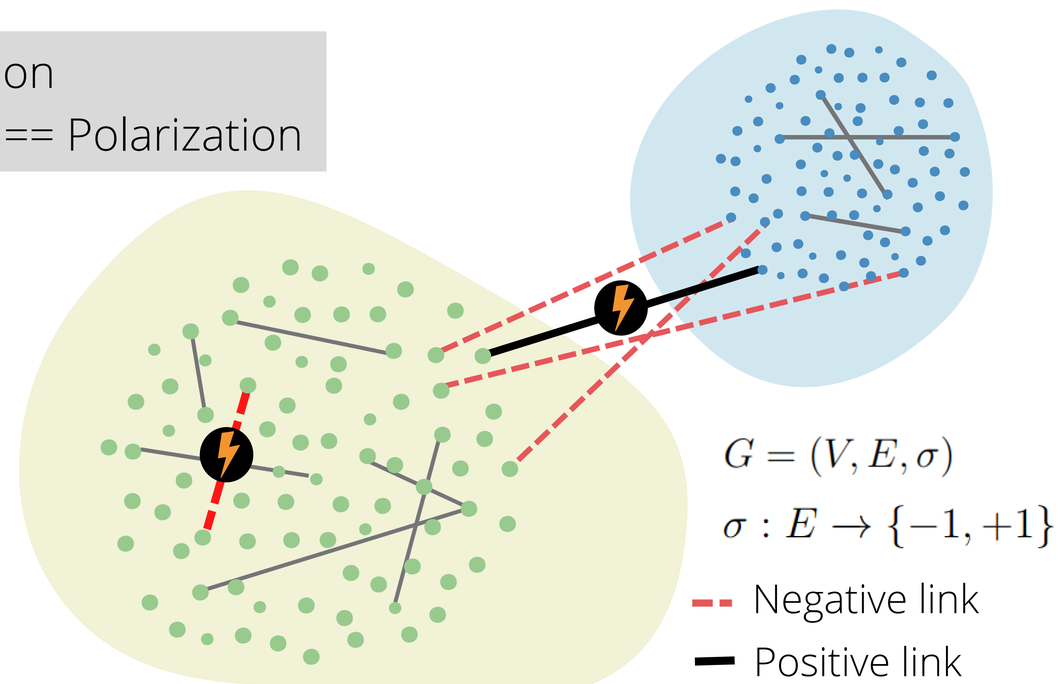
$$f_G = \sum_{(i,j)} f_{ij}$$

Minimization problem (NP Hard)

$F(G) = 1 - \frac{L(G)}{m/2}$ *Normalized frustration index* [1]

$P^* = \{X^*, V \setminus X^*\}$ so that $X^* = \arg\min_{X \subseteq V} f_G(X)$

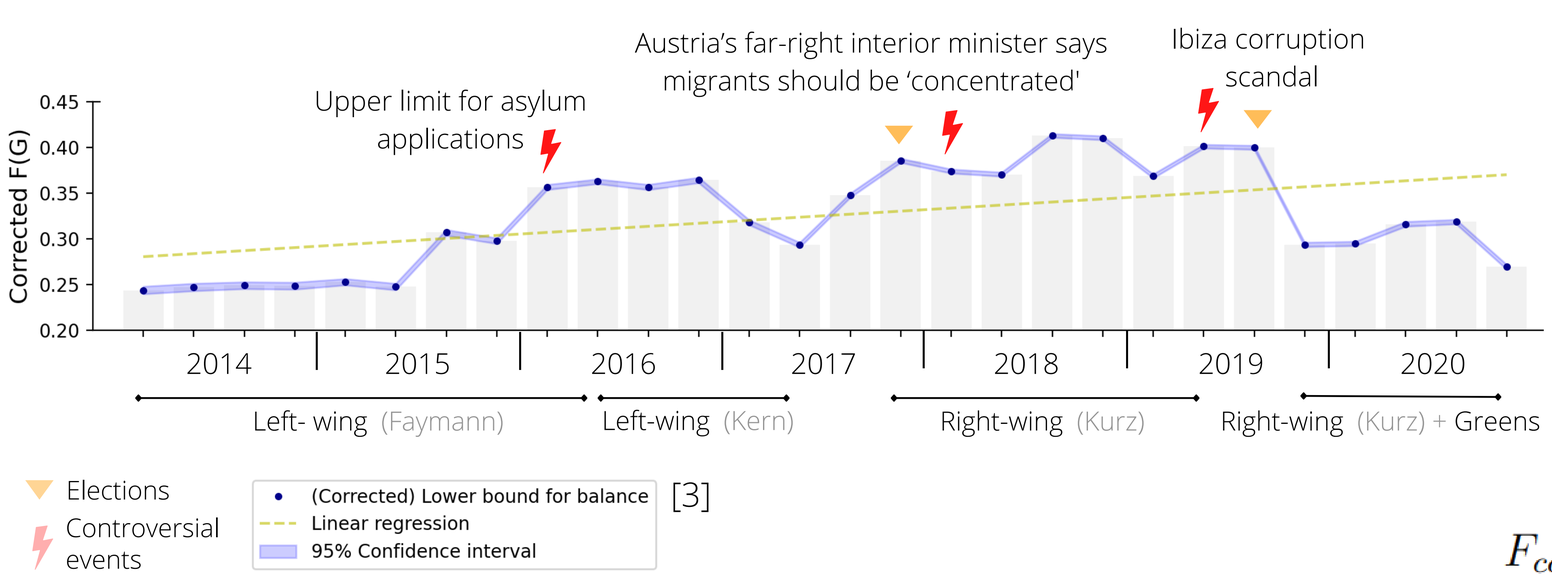
with $L(G) = \min_{X^* \subseteq V} f_G(X)$



[2] **Partition assessment: meso-measurements**

% External negatives?
DIVISIVENESS
% Internal positives?
COHESIVENESS

Polarization is a reactive phenomenon



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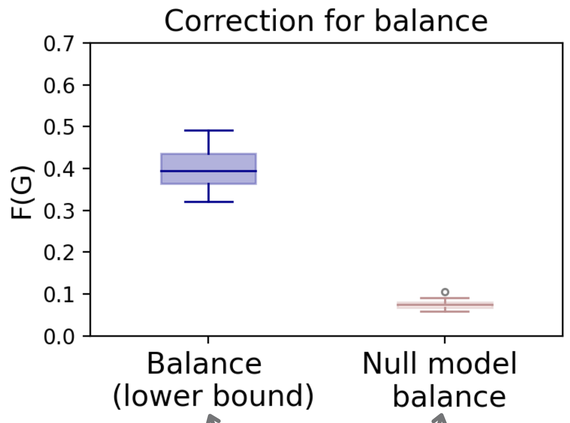
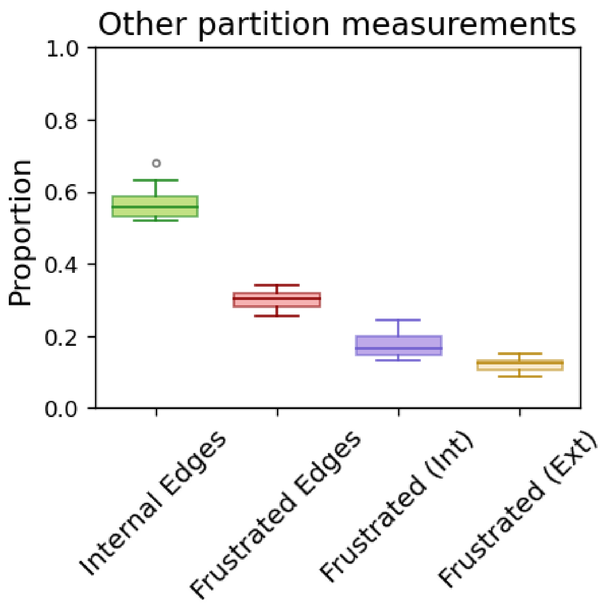
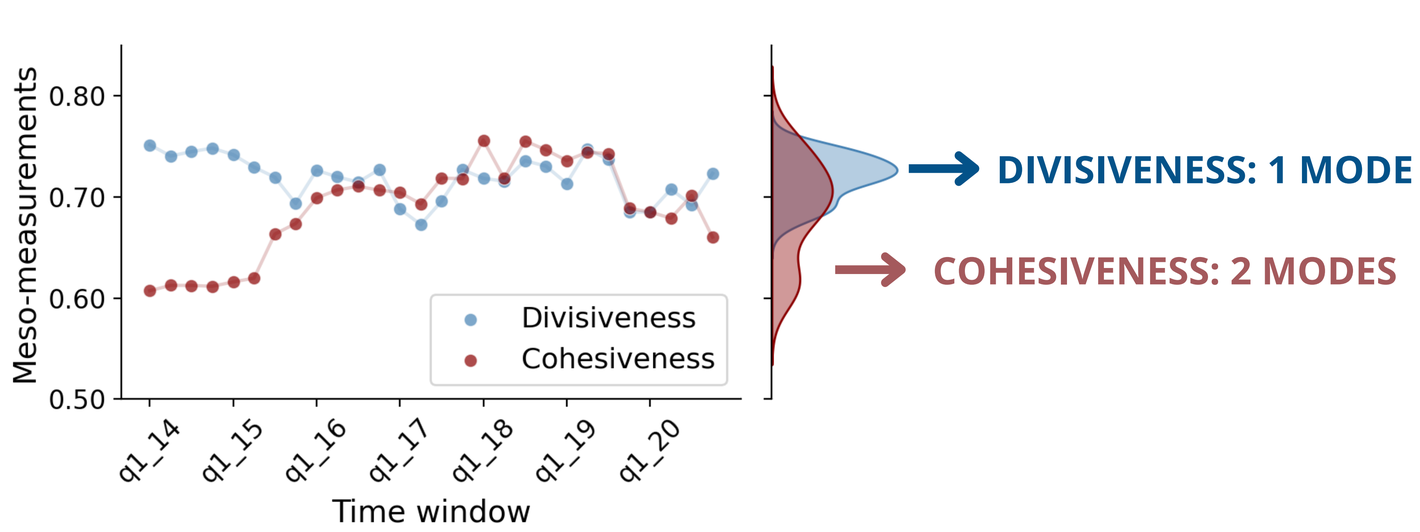


$$F_{corrected}(G) = F(G) - \overline{F(G_{shuffled})}$$

Changes in polarization are driven by stronger cohesion





[1] **Aref, Samin, and Mark C. Wilson.** *Balance and frustration in signed networks.* (2019)

[2] **Aref, S., Dinh, L., Rezapour, R., & Diesner, J.** *Multilevel structural evaluation of signed directed social networks based on balance theory. (2020)*

[3] **Doreian, P., & Mrvar, A.** *Partitioning signed social networks. Social Networks.* (2009)