Combining homophily in interaction and opinion spaces: A bounded confidence approach

——— Extended Abstract ———

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1. Introduction

Homophily, the tendency of individuals to associate preferentially with others sharing similar attributes, is a central concept in understanding social network evolution. Yet, existing empirical studies have largely focused on "external" sociodemographic traits (such as age, gender, interests, or cultural background), leaving open whether interactions genuinely reflect deeper cognitive alignments—namely shared opinions or values. In this work, we address this fundamental gap by empirically testing the Bounded Confidence (BC) hypothesis—namely, that individuals primarily engage with neighbors whose opinions lie within a small range from their own—using large-scale data from Reddit and Twitter. Our goal is to examine whether such cognitively bounded interactions occur more frequently than expected under degree-preserving randomizations, and how tie strength or asymmetric tolerance influence these patterns.

2. Social media datasets and setup

We consider three heterogeneous sets of data from Reddit and Twitter platforms, in which both opinions and social interaction graphs are assembled in different ways: (1) Reddit posts from US politics subthreads [1], where user opinions are derived from sentiment analysis and replies to posts define interaction edges; (2) Twitter conversations on Covid-19, with tweet-level sentiments aggregated into user opinions, and replies as interaction edges; and (3) Twitter user relationships centered on highly contentious political topics (e.g., abortion, gun control) [2], where fact-checked contents approximate user opinions and follower links indicate interaction edges.

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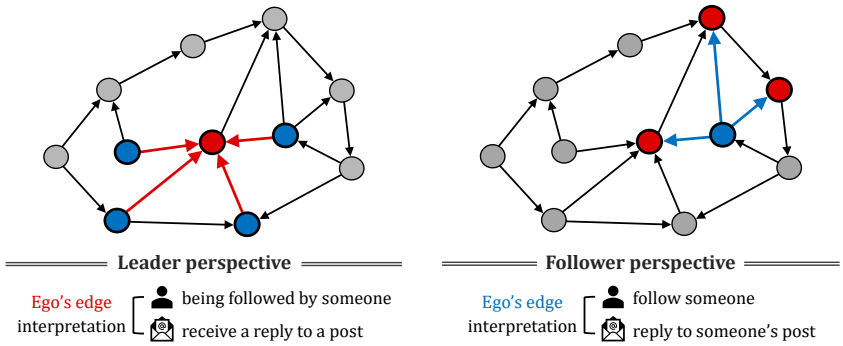

Figure 1: Illustration of neighbor sets.

Alongside comparing reply-based (weaker) and follow-based (stronger) networks of interactions, we distinguish two perspectives when identifying a user's neighbors: a leader perspective (in which neighbors are in-neighbors, "Who does Ego influence?") versus a follower perspective (with out-neighbors as neighbors, "Who influences Ego?"), as illustrated in Figure 1.

3. BC metrics and null models

To test whether online interactions conform to the BC hypothesis, we define several BC-inspired indicators and evaluate them at both individual and population levels. As a baseline for comparison, we construct null models that randomize interaction patterns while retaining each user's in- or out-degree, allowing us to assess whether observed homophily exceeds random expectations.

4. Key findings

Our results confirm that BC effects are indeed pervasive in online social media interactions, but highlight notable variability linked to tie strength and interaction type. Weaker ties such as reply-based interactions generally support moderate homophily with occasional cross-ideological exchanges, whereas stronger ties such as follow-based interactions substantially intensify like-minded opinion clustering and reinforce echo chambers.

Additionally, we observe that individual tolerance ranges are often asymmetric, reflecting greater acceptance of moderate, mainstream-aligned opinions over more radical deviations from their current ideological stance.

References

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