# Opinion Formation in a Model Twitter Network

*Keywords: Agent-based modelling, opinion formation, social network analysis, graph theory*

## Extended Abstract

With political polarization reaching historic highs [2], and overwhelming evidence that attitudinal social media consumption exacerbates the issue [5], it is more pressing than ever to understand the underlying mechanisms of opinion-related social influence on platforms like Twitter. Previous explorations into opinion dynamics have relied on simple computational models with an idealized community-network structure, which are unlikely to be useful for real interventions in Twitter's functioning [1][3][4]. This presentation outlines a method for constructing a small-scale model of the Twitter follower network, using graph theory to capture key topological features from a comprehensive analysis conducted in 2014 [6]. The model is then used as the connective structure of an agent-based population with abstract opinion values, which are simulated to interact with each other—iteratively updating their opinions according to existing theories of social influence. During the simulations, the population converges on certain opinion-distributions, which are indicative of the level of polarization in the community. By comparing opinion dynamics on this model with a 'complete' network (in which everyone talks to everyone), we can better understand how the structure of Twitter predisposes a population towards certain behaviors. In simulations which assumed both *similarity bias* (agents with sufficiently similar opinions become more alike) and *repulsive influence* (agents with opposing beliefs polarize each other further), the Twitter model was *more likely* to produce a population with extreme opinions [4]. This was due to structural features that make it more likely for extreme groups to form, and for celebrity users within such groups to influence the 'moderate majority'.

While this static model was needed to determine the *structural* influences of Twitter on user opinions, a dynamic model was crucial for representing the site's *functional* influences (such as curated feeds and recommendation algorithms). This functionality was added to the network model through *weighted edges*, in which the weight of a connection between two agents is equal to the probability of an interaction occurring between them. These edge weights were updated dynamically to increase after a positive interaction and decrease after a negative interaction, to varying degrees. In simulations, the dynamic model increased the number of significant consensus groups that were formed through only *similarity bias*, indicating that heavy curation of opinion access can result in fragmented subgraphs that are isolated from other opinions. Meanwhile, simulations which also assumed *repulsive influence* demonstrated that dynamic curation can *decrease* the likelihood of a population having extreme/polarized opinions, by limiting access to opposing beliefs. These conflicting observations emphasize the need for a more thorough verification of *similarity bias* and *repulsive influence* as accurate assumptions for social behavior on Twitter. The dynamic model is also limited in its depiction of Twitter's content curation, as the boosting of positive interactions does not fully capture the engagement-based approach to recommendations (given that it ignores the increased engagement in reaction to controversy). Despite this, it provides a good framework for future explorations, which can place more emphasis on accurately replicating Twitter's algorithms.

# References

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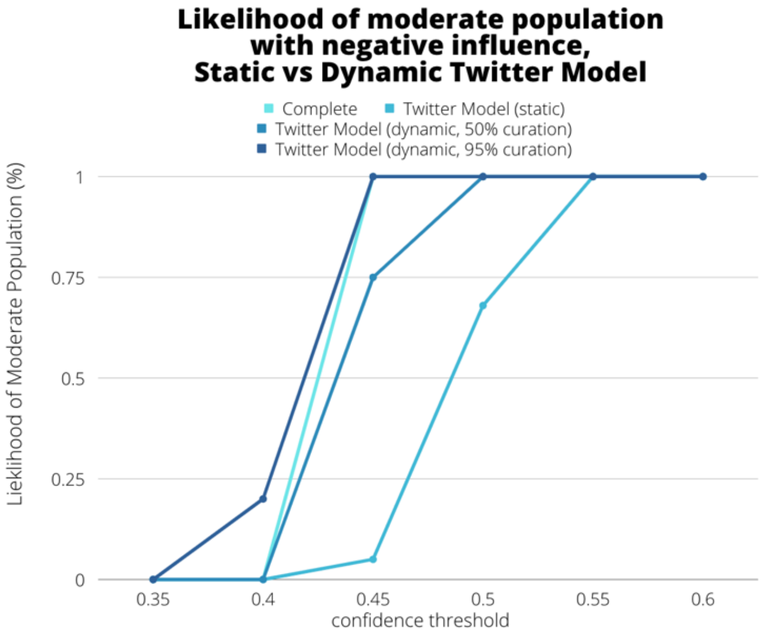


Fig. 1