# C Datasets and experimental results

## C.1 Real-world datasets

Table 2: Real-world dataset summary

| Network | $\|V\|$ | $\|E\|$ | Event |
|---|---|---|---|
| Karate | 34 | 78 | Friendship |
| Tw:Club | 703 | 3322 | Barcelona in La-liga 2016 |
| Tw:Sport | 703 | 3322 | Juventus vs Real Madrid 2015 |
| Tw:US | 533 | 13564 | US Presidential Election 2016 |
| Tw:UK | 231 | 905 | British Election 2015 |
| Tw:Delhi | 548 | 3638 | Delhi Assembly Election 2013 |
| Tw:GoT | 947 | 7922 | GoT promotion 2015 |

## C.2 Influence of the opinion vector $\mathbf{y}(0)$ and network topology $G$

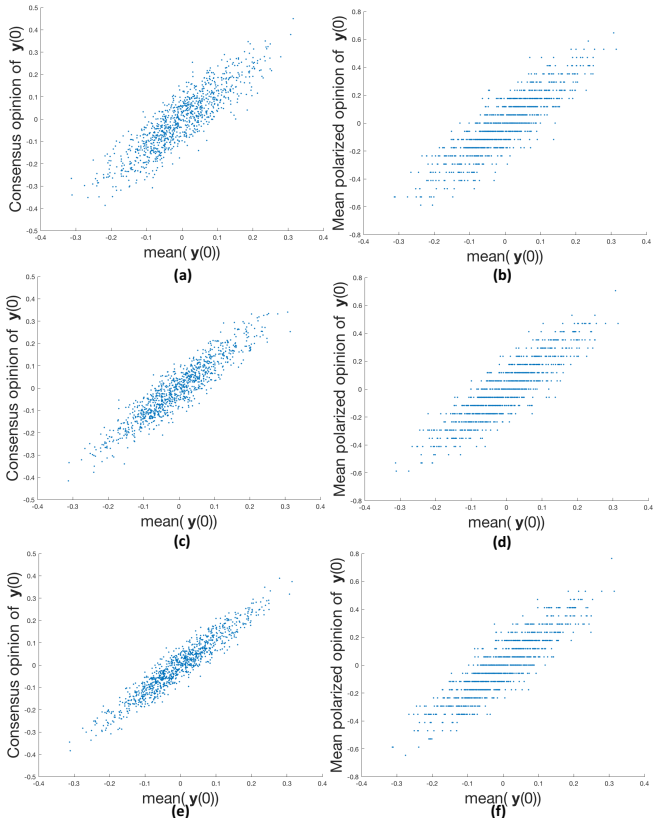


Figure 7: For 1000 random $\mathbf{y}(0)$. (a) and (b) on a BA model ($n = 34, M_0 = 3, M = 2$); (c) and (d) on an ER model ($n = 34, \rho = 0.139$); (e) and (f) on a WS model ($n = 34, K = 2$). The left column of (a), (c), (e) - the consensus opinion when $\beta = 1$; the right column of (b), (d), (f) - the mean polarized opinion when $\beta = 10$.

This figure corresponds to the Figure 5, and is used to investigate both the effects of the opinion vector and the network topology. Horizontal subfigures show the different consensus and polarization converging states for different $\mathbf{y}(0)$s, while the vertical subfigures show the differences between the three types of random networks of similar sizes. The finding of this experiment is consistent with that of Figure 6(b).

## C.3 Influence of model parameters

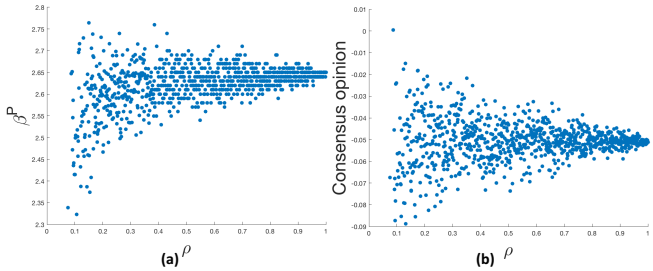


Figure 8: For an random opinion vector $\mathbf{y}(0)$, on ER models with $n = 100$ and $\rho \in (0, 1]$. (a) the value of $\beta^P$ for the $\mathbf{y}(0)$; (b) the consensus opinion reach by $\mathbf{y}(0)$ when $\beta = 1$.

This experiment takes the ER model as an example and investigate the influence of the parameter $\rho$ on the network topology, thus resulting in the influence on the opinion dynamics.

## C.4 Influence of edge placements

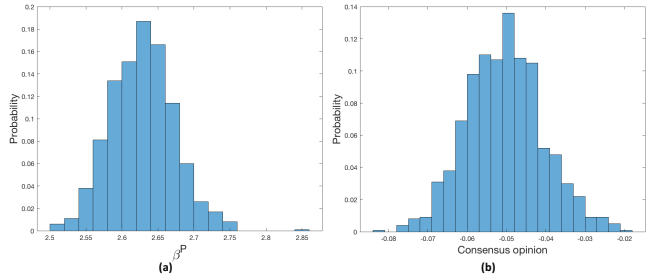


Figure 9: For an random opinion vector $\mathbf{y}(0)$ with mean $-0.0395$, on 1000 ER models with $n = 100$ and $\rho = 0.4$. (a) the value of $\beta^P$ for the $\mathbf{y}(0)$; (b) the consensus opinion reach by $\mathbf{y}(0)$ when $\beta = 1$.

ER model is taken again as the example here for investigating the influence of the network edge placements on the opinion dynamics. It shows that the network topology does have significant influence on the value of $\beta^P$ and the consensus opinion value.

## C.5 Influence of network edge addition/deletion

We can also investigate the question: If someone wants to maximally increase/decrease the value of consensus or the average value of opinions in polarized state, which edge should be removed/added?

**Add One Edge - Consensus.**

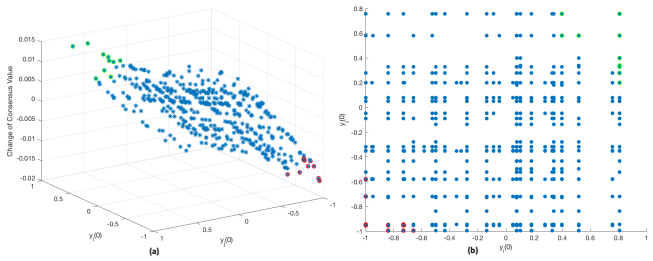

Figure 10: Add one edge on Karate network to change the consensus opinion - $\beta = 1$. Top 10 best choices are highlighted: green for increase and red for decrease.

**Delete One Edge - Consensus.**

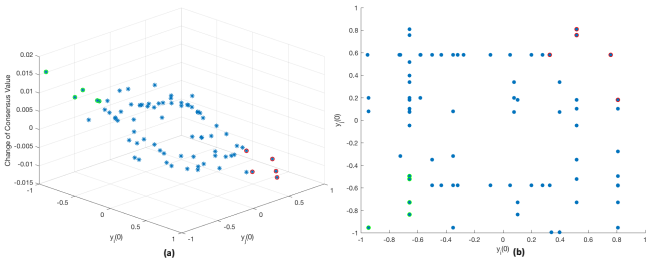

Figure 11: Delete one edge on Karate network to change the consensus opinion - $\beta = 1$. Top 5 best choices are highlighted: green for increase and red for decrease.

It shows in Figure 10 and 11 that in order to maximally decrease the consensus value by editing one edge, adding the edge between the most opinionated disconnected negative nodes is the best choice when allowing only addition; while deleting the edge between the most opinionated connected positive nodes works if allow only deletion. To decrease the consensus value can be achieved adding the edge between the most positive opinionated nodes or deleting the one between the most negatively opinionated nodes.

**Edge edition that has almost no influence on consensus.**

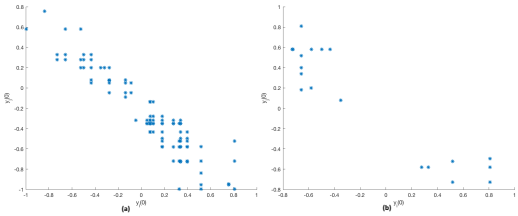

Figure 12: Additions - (a) and Deletions - (b) that cause minor change in consensus values on Karate network. ($|\text{change}| < 10^{-3}$)

However, the connections between nodes with opposing equivalent (i.e., in terms of absolute opinion value) opinions have almost no influence on the consensus value, as shown in Figure 12. In contrast, when the network gets polarized, the neighbors of the neutral nodes have more significant influence on the mean polarized opinions.