Limited visibility on the Majority-vote model via scale-free networks

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The advancement of technology has made social internet networks an integral part of human society. However, algorithms and AI have led to systematic content filtering, creating filter bubbles. This work investigates the impact of limited visibility on social influence in the two-state majority-vote model on scale-free networks. In this model, individuals adopt the majority opinion of their neighbors with a probability of $1 - q$. Furthermore, they disagree with a chance of q, known as the noise parameter. The visibility parameter V represents an individual's likelihood of considering their neighbor's opinion and models the limited visibility phenomenon. We construct a social network of interactions using a fully connected network with $z+1$ nodes, where new nodes are connected to z neighbors proportional to their connectivity until we reach N nodes. We utilize Monte Carlo simulations to determine the critical noise parameter as a function of V and z and obtain the resulting phase diagram of the model. We also calculate the critical exponents β/ν and γ/ν of the model related to magnetization and susceptibility using finite-size scaling analysis and validate the unitary relation.