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Stopping the Spread: A Network-Based Stochastic Model of Fake News Correction

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Abstract

In recent years, misinformation has become a prevalent societal challenge. Social media platforms have grown ubiquitous and have enabled the rapid and widespread dissemination of fake news. This study aims to provide practical guidance for developing more effective debunking strategies. This is a meaningful but challenging endeavor, given the fine line between beliefs catching on and being corrected. In this thesis, we develop a stochastic model to simulate the spread of misinformation and its correction in social networks. We construct the network using a configuration model and apply a modified SIR model to simulate belief spread. In our simulations, we study how misinformation propagates through the network and how the introduction of skeptical agents can help in mitigating this spread. Final outcomes depend on the timing and effectiveness of debunking interventions. We find that early introduction of skeptical individuals is crucial for limiting misinformation spread. Timely intervention curbs belief adoption effectively and delayed debunking is only successful if it is strong. This study also shows the importance of the network structure, as highly connected hubs amplify belief spread. Finally, the balance between belief persuasiveness, debunking strength, and the capacity of skeptics to influence others determines the final outcome.

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