

## Multi-Scale Control Model for Network Group Behavior

**Authors :** Fuyuan Ma, Ying Wang, Xin Wang

**Abstract :** Social networks have become breeding grounds for the rapid spread of rumors and malicious information, posing threats to societal stability and causing significant public harm. Existing research focuses on simulating the spread of information and its impact on users through propagation dynamics and applies methods such as greedy approximation strategies to approximate the optimal control solution at the global scale. However, the greedy strategy at the global scale may fall into locally optimal solutions, and the approximate simulation of information spread may accumulate more errors. Therefore, we propose a multi-scale control model for network group behavior, introducing individual and group scales on top of the greedy strategy's global scale. At the individual scale, we calculate the propagation influence of nodes based on their structural attributes to alleviate the issue of local optimality. At the group scale, we conduct precise propagation simulations to avoid introducing cumulative errors from approximate calculations without increasing computational costs. Experimental results on three real-world datasets demonstrate the effectiveness of our proposed multi-scale model in controlling network group behavior.

**Keywords :** influence blocking maximization, competitive linear threshold model, social networks, network group behavior

**Conference Title :** ICWAIM 2025 : International Conference on Web-Age Information Management

**Conference Location :** Jeddah, Saudi Arabia

**Conference Dates :** February 17-18, 2025