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Influence Maximization in Ising Networks[1] CHRISTOPHER LYNN, DANIEL LEE, Univ of Pennsylvania — In the analysis of social networks, a fundamental problem is influence maximization: Which individuals should be influenced to maximally impact the collective opinions of an entire population? Traditionally, influence maximization has been studied in the context of contagion models and irreversible processes. However, by including stochastic noise in the opinion formation process, repeated interactions between individuals give rise to complex macroscopic patterns that are observed, for example, in the formation of political opinions. Here we map influence maximization in the presence of stochastic noise onto the Ising model, and the resulting problem has a natural physical interpretation as maximizing the magnetization given a budget of external magnetic field. Using the susceptibility matrix, we provide a gradient ascent algorithm for calculating optimal external fields in real-world social networks. Remarkably, we find that the optimal external field solutions undergo a phase transition from intuitively focusing on high-degree individuals at high temperatures to counterintuitively focusing on low-degree individuals at low temperatures, a feature previously neglected under the viral paradigm.

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