PPRANK: ECONOMICALLY SELECTING INITIAL USERS FOR INFLUENCE MAXIMIZATION IN SOCIAL NETWORKS

ABSTRACT

- This paper focuses on seeking a new heuristic scheme for an influence maximization problem in social networks: how to economically select a subset of individuals (so-called seeds) to trigger a large cascade of further adoptions of a new behavior based on a contagion process.
- Most existing works on selection of seeds assumed that the constant number kseeds could be selected, irrespective of the intrinsic property of each individual's different susceptibility of being influenced (e.g., it may be costly to persuade some seeds to adopt a new behavior).

- In this paper, a price-performance-ratio inspired heuristic scheme, PPRank, is proposed, which investigates how to economically select seeds within a given budget and meanwhile try to maximize the diffusion process. Our paper's contributions are threefold. First, we explicitly characterize each user with two distinct factors: the susceptibility of being influenced (SI) and influential power (IP) representing the ability to actively influence others and formulate users' SIs and IPs according to their social relations.

EXISTING SYSTEM

- In particular, we focus on the influence maximization problem first stated by Domingos and Richardson : Given a specific diffusion model, if a subset of individuals could be convinced to adopt a new product and the goal is to trigger a large cascade of further adoptions, which set of individuals should be targeted in order to achieve a maximized influence? It was shown that finding the influential set of initial nodes (so-called seeds) is an NP-hard problem, and only for the sub modular function of the diffusion model, a simple greedy algorithm (choosing the nodes with maximal marginal gain) could approximate the optimal solution by a(1−1/e), i.e., within 63% of optimal .

- However, the simple greedy-based approach has a heavy computation load. Specifically, greedy-based algorithms calculate the influence power precisely by enumeration.

DISADVANTAGES

- All existing work on the issue of influence maximization through properly selecting initial seeds, we assumed that edges in a social graph were labeled with probabilities of influence between users.

PROPOSED SYSTEM

- This paper proposes a new heuristic algorithm, PPRank, for economically selecting seeds to maximize influence. In detail, our main contributions are threefold.
- First, we explicitly characterize each user with two distinct factors: susceptibility of being influenced (SI) and influential power (IP), and formulate users' SIs and IPs according to their social relationships.
- Second, we argue that each user's SI is an implicit measurement of persuasion cost (PC): Qualitatively the less a user's SI is, the more cost would be used to persuade the user.

- Therefore, inspired by the properties of price-demand function in economic field, our paper properly converts individual's SI into PC, and then, a novel seed selection algorithm is proposed, which utilizes both the price-performance ratio (PC-IP ratio) and IP as an integrated selection criterion, and explicitly takes into account the over-lapping effect.

ADVANTAGES

- The first is to improve those greedy algorithms to further reduce their running time.
- To reduce the number of evaluations on the influence spread of nodes

CONCLUSION

- Given the underlying social network structure and influence model, our paper focuses on the interesting problem of maximizing influence propagation of new behavior in social networks.
- The literature has greatly studied the mentioned problem from two directions: the enhanced greedy algorithms and various heuristic schemes.
- However, all existing works ignore one key aspect of influence propagation that we usually experience in real social life: The cost used to persuade individuals to adopt a new behavior might vary highly (due to their different susceptibilities of being influenced).