

# Chapter 7

## Conclusions and Future work

Influence maximization aims to find the small set of nodes (Seed nodes) with the highest diffusion in social networks to maximize the information spread. In this dissertation, we have designed and developed few algorithms for influence maximization in multilayer networks. The objective of this thesis is to find the most influential nodes in multilayer networks using different approaches like community-based structures, heuristic-based methods, and clique-based structures. In addition, we also tested our algorithms on the various standard datasets using two well-known propagation models for influence spreading.

### 7.1 Conclusions

We design and develop CIM, a clique-based heuristic for finding influential nodes in multilayer networks. CIM finds the seed nodes using a clique-based structure. It finds all the maximal cliques in the multilayer networks. After that, seed nodes are selected from these generated cliques. One of the disadvantages of CIM is its insensitivity to the community structure. This thesis proposes SIM, Similarity-based community method for influence maximization. SIM overcomes the disadvantages of CIM. SIM is an incremental community-based algorithm for influence maximization. Generally, individuals in a community interact frequently and are more likely to influence each other. In this work, SIM propose weighting index (WI), which is used in SIM for detecting the initial communities (DIC). Then SIM consolidates some small communities using cut similarity metric to form the final community set. Then SIM selects the seed

nodes from the communities using a quota-based approach.

One of the disadvantages of SIM is the lack of quality communities and seed nodes. This thesis proposes CBIM, community-based influence maximization in multilayer networks. CBIM is another community-based influence maximization algorithm to find influential nodes for spreading information. CBIM overcomes the disadvantages of SIM. CBIM also finds the most influential nodes using community structure. SIM and CBIM take more processing time for communities detection and seed node selection. This thesis proposes a K++-Shell decomposition algorithm. It reduces the time complexity and improves the performance in influence spreading than previous algorithms—the K++-Shell decomposition algorithm, which aims to find the most influential nodes in multilayer networks. K++-Shell decomposition is the improved version of the K-Shell decomposition algorithm. We observe that our proposed algorithms are efficient and maximize the influence spread. We also conducted experiments with our proposed algorithms on standard datasets, and from our results, we can conclude that K++-Shell decomposition outperforms CIM, SIM, and CBIM.

## 7.2 Future directions

In this thesis, we evaluated our algorithms using two popular propagation algorithms, IC and LT. It will be interesting to run these algorithms on other propagation models like the Layered cascade (LC) model, weighted cascade (WC) model, etc.

Exploring the Recommender systems approach to select seed nodes in multilayer networks will be interesting. In addition to influence maximization, Link prediction is extensively studied in social network structures, especially in single layer networks. Link prediction includes forthcoming links, recommendation systems, and friend suggestions. It will be interesting to explore the influence maximization using link prediction in multilayer networks.