

Information propagation in evolving multi-functional multiplex Online Social Networking platforms

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Abstract

Nowadays individuals are connected in various social networking platforms such as Facebook, Twitter and LinkedIn. A common truth, which is presented in literature studies, is that the same person handles a profile in more than one online social networking platforms, of different types. Furthermore, user's communities structure and interaction patterns are influenced by the type of the platform. For instance, Twitter is primarily used to obtain and publish daily information ("Social" OSN) whereas LinkedIn is mainly used to maintain professional contacts and publish career related information ("Professional" OSN). We plan to investigate the correlation between the difference in functionality and the topological properties of the multiplex network (a system which consists of multiple network layers). The overlap of links will be of special interest in this scenario. The overlap denotes the correlation between the existence of a link between certain nodes in different layers. The different functionalities could lead to increased information diffusion in the whole system. Moreover, data retrieved from different OSN types provide us with a complete set of information about a person; information about his interests, friends, colleagues, curriculum vitae etc. We aim in analyzing this information in order to investigate the influence of different life-fields in users ego-network structure and online social networking interactions.

Multiplex structure

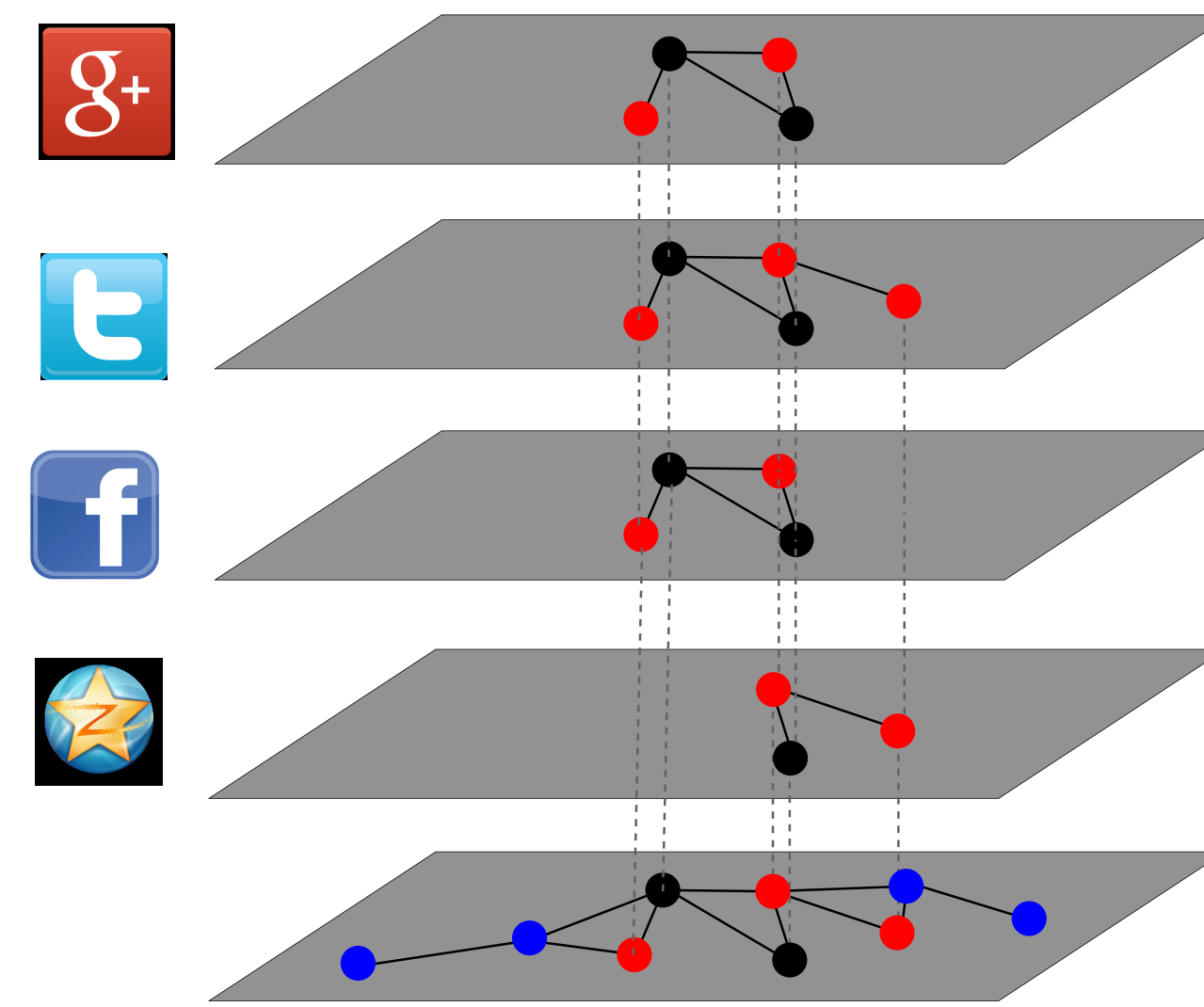


Fig. 3: Multiplex structure of OSNs.

Individuals are usually subscribed to several online social network services. We plan to investigate important consequences from this fact both from a theoretical and empirical perspective.

It is important to note that the different networks are used for different purposes. For instance, the use of Facebook mainly aims at maintaining the connections with friends and acquaintances whereas Twitter is used for the spread of information and LinkedIn for the particular application of enhancing career orientated networking.

We plan to investigate to which extend the different functionalities of the networks are represented in the topological features of the multiplex structure (see Fig. 3).

Data Collection Challenges

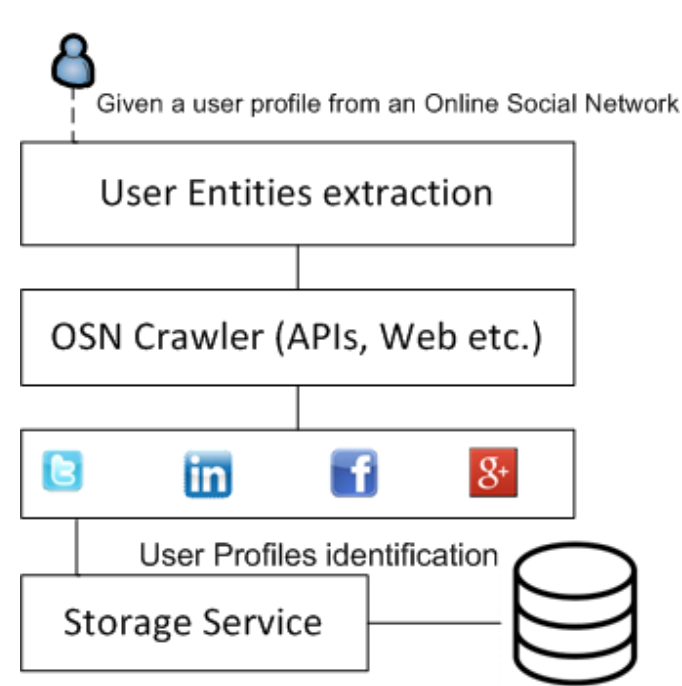


Fig. 1: Dataset collection with user profile matching functionality.

With this research we aim in analyzing users' activity and ego-networks in different online social networking platforms. The first challenge that we should address is the collection of the dataset that will be used.

The nature of this project requires the collection of a sophisticated dataset that contains profiles that are maintained from the same user in different social networks.

We plan to implement and evaluate user-matching techniques that will help us to collect an un-biased sample. This includes the identification of resources and collection of data that will act as ground truth in our evaluation.

Overlap

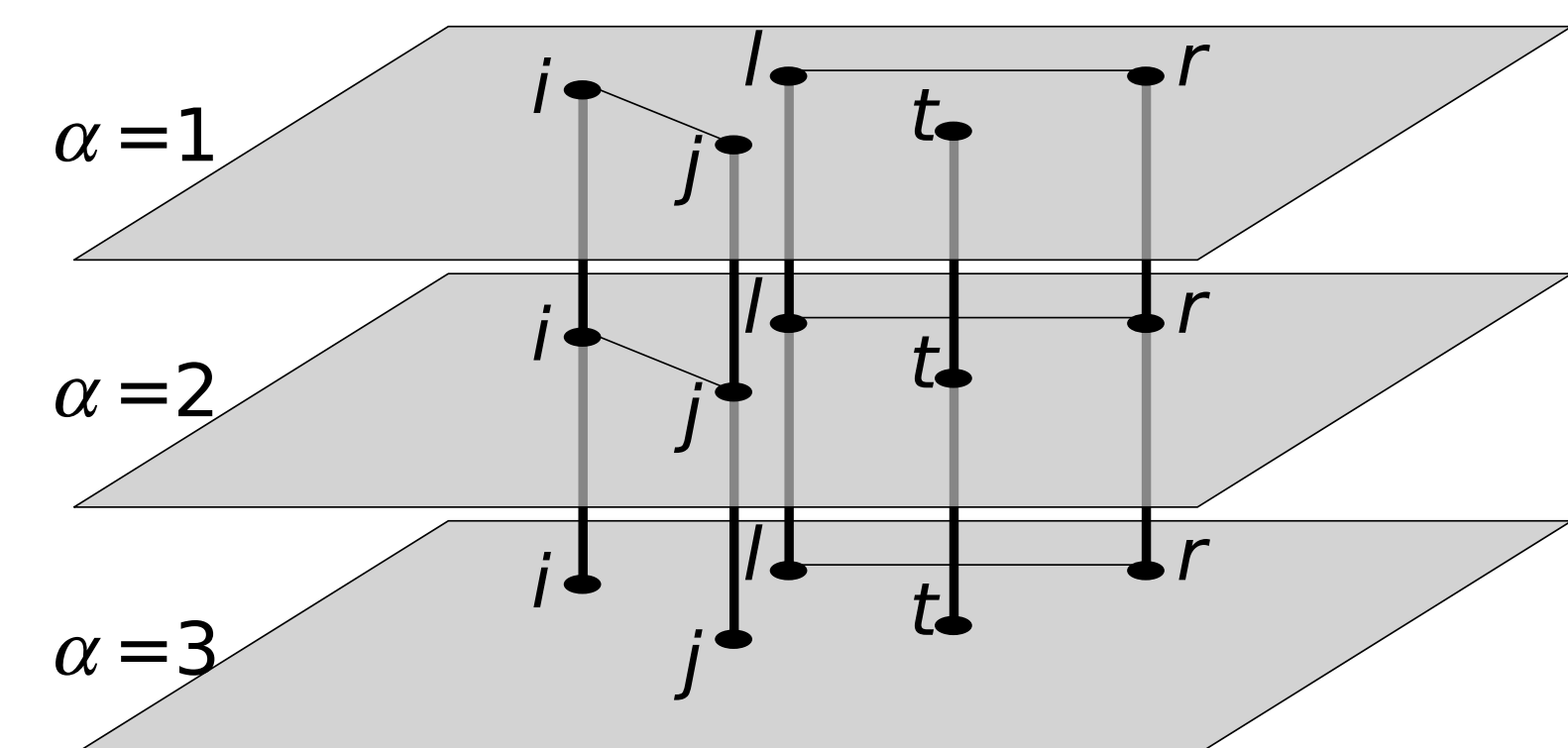


Fig. 4: Overlap in multiplex systems. Figure taken from [1].

The overlap is a measure of the correlation of a certain link in the different layers of a multiplex network [1]. Empirical studies have revealed that real multiplex systems have a higher overlap than expected from random networks.

Behavior and Influential Factors



Fig. 2: The same user maintains different profiles in Online Social Networking platforms. His behavior is highly related with the type of the OSN.

Having enriched information for the same person that comes from different sources provides researchers with the ability to investigate the correlation between his actions in a variety of fields. In our case, with the collection of profiles that are maintained by the same user in different types of OSNs we will be able to investigate his interactions and the factors that influence them.

Does the industry where user work have a relation with his twitting behavior? Does company's operations shift influence its employees'-users behavior in Facebook? Did the last uploaded photo of a user in Flickr influence his Twitter ego-network evolution?

Answers to such questions are in high interest not only from the research community but also from the industry, as they provide insights about employees' and customers' activities. Due to the fact that the user interacts differently according to the type of the platform that he uses, we plan to extract knowledge about a variety of fields.

Evolution and functionality

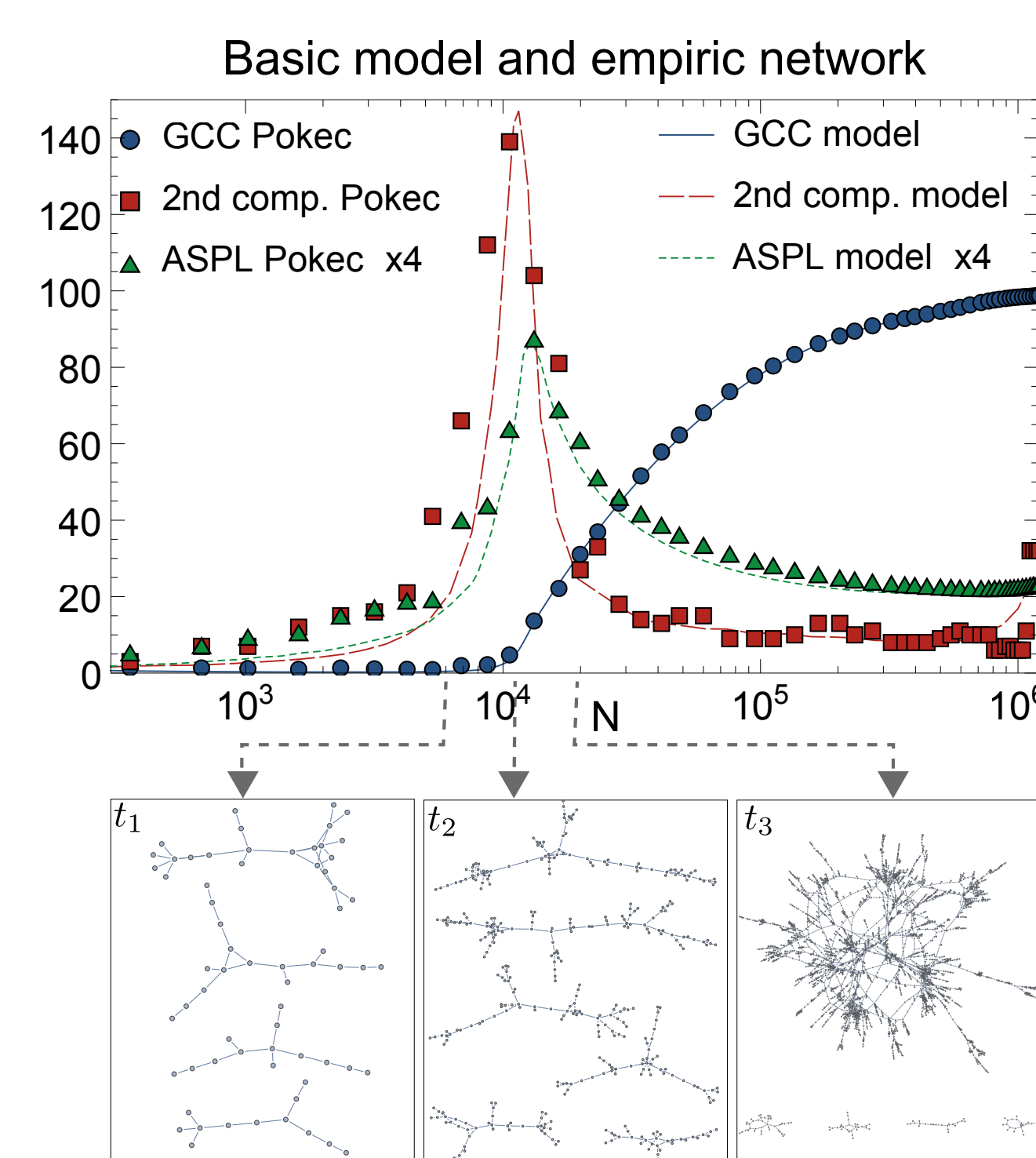


Fig. 5: Evolutionary path of friendship based online social networks [2].

We plan to investigate the relationship between the topological evolution and the functionality of the system.

The evolution of friendship orientated networks is governed by the preexisting social structure and the combination of a viral spreading mechanism and mass media influence as shown in [2]. In addition, individuals have a higher tendency to subscribe if they were invited by weaker social contacts, in accordance with the theory of the "strength of weak ties" by Granovetter [3]. To investigate if the latter holds for a network like LinkedIn poses an interesting research task.

However, we expect the topological evolution of information based networks like Twitter to be determined by different mechanisms. We believe that the optimization of popularity and similarity for connection candidates [4] combined with suitable dynamics constitutes an appropriate framework for the description of these systems.

Literature

References

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