Foreword

Research in modeling, analyzing and mining large-scale networks has attracted an increasing effort in the last few years. Two main reasons, at least, may explain the rapid growth of interest in this field, as attested by the increasing number of scientific publications about this topic:

- On one hand, many datasets studied in various different fields are best described by graphs or linked collection of interrelated objects. Examples cover a wide variety of application fields including: biological system studies, (protein interaction, gene/miRNA regulation, ...,) the world wide web, bibliographical networks (co-authoring, citation, ...), P2P networks, semantic networks, and of course the now very popular on-line social networking and microblogging sites (e.g., Facebook, Twitter, Google+), folksonomy-oriented sites (e.g., Foursquare, Delicious, Flickr) and social media platforms (e.g., YouTube, last.fm). Far beyond sharing a networked structure, many of these naturally arising graphs share some non-trivial features (such as power-law node's degree distribution, small separation degree, high clustering coefficient, low density, ..., etc). This fact has boosted the research in analyzing and mining this class of networks since findings in one field are expected to be easily applied to other analogue fields.

- On the other hand, recent technological advances, in different areas, allow today generating, elaborating and tracking the spatial and temporal evolution of very large scale networks. For example, in systems biology, continuous improvement of technologies has enabled to provide high-throughput and heterogeneous datasets (genomic, proteomic, transcriptomic and metabolomic) allowing to construct huge networks with both rich node and edge meta-data. The possibility of repeating the same experiment at different time points allows to track the evolution of obtained networks, opening the way for understanding the causal relationships between nodes and how these interactions change over time. Purchase data collected on e-commerce sites allow to build very large scale networks connecting customers to products they bought. Again, analyzing and mining such networks would provide new directions for product recommendation computation. On-line social network sites connecting millions of users and publicly available bibliographical databases featuring millions of entries are some examples where a temporal sequence of large-scale networks can be sampled. 10^7 nodes size networks are no more an exception. The spatial evolution of social phenomena is another promising field of research. For instance, investigating how memes diffuse geographically may support the validation or even the discovery of new important sociological hypotheses.

The second edition of our Workshop on Dynamic Networks and Knowledge Discovery has received 15 submissions: 8 were only accepted as long presentations. These are organized into three main sessions:

Application session: This contains two papers. The first one by *Shijaku et.al.* introducing the concept of dynamic embeddedness with an application to the analysis of global pharmaceutical industry interaction network. The second paper is proposed by *Correa and Alves*, in which they provide a functional and visual analytic system for the exploration of enriched metabolic pathways on microbial genetic network.

Large-scale network session: Three papers are included in this session. The first, proposed by *Tabourier et. al.*, tackles the problem of link prediction applying an original rank merging approach. The second paper, by *Grube et. al.*, deals with large-scale network sampling. The last paper, proposed by *Geigl and Helic*, presents a study on alternative approaches of decentralized search, stemming from the very famous papers by Kleinberg and Adamic on the same topic.

Dynamic network session: This session include also three papers. The first one is by *Redmond and Cunningham* in which they propose a method to detect over-represented temporal motif in time-evolving network. the basic idea is to compare the frequency of temporal motif against that of a random temporal network. The second paper, by *Vukadinovic Greetham and Ward*, presents a study of dyadic and multi-actor conversations in twitter. Lastly, *Ben Abdrabbah et al.* present a framework for recommendation computations based on communities detected on time-stamped data.

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