With the rapid expansion of the Internet and WWW, the problem of analyzing social media data has received an increasing amount of attention in the past decade. The boom in social media platforms offers many possibilities to study human collective behavior and interactions on an unprecedented scale. In the past, much work has been done on the problem of learning from networked data with homogeneous topologies, where instances are explicitly or implicitly interconnected by a single type of relationship. In contrast to traditional content-only classification methods, relational learning succeeds in improving classification performance by leveraging the correlation of the labels between linked instances. However, networked data extracted from social media, web pages, and bibliographic databases can contain entities of multiple classes and linked by various causal reasons, hence treating all links in a homogeneous way can limit the performance of relational classifiers. Learning the collective behavior and interactions in heterogeneous networks becomes much more complex.

The contribution of this dissertation include 1) two classification frameworks for identifying human collective behavior in multi-relational social networks. 2) unsupervised and supervised learning models for relationship prediction in multi-relational collaborative networks. Our methods improve the performance of homogeneous predictive models by differentiating heterogeneous relations and capturing the prominent interaction patterns underlying the network structure. The work has been evaluated in various real-world social networks. We believe that this study will be useful for analyzing human collective behavior and interactions specifically in the scenario when the heterogeneous relationships in the network arise from various causal reasons.

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The public is welcome to attend.