NETWORK ANALYSIS OF ONLINE AUCTION

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Abstract

The paper presents the use of methods of social network analyses in the area of online systems with a view to electronic auction. The paper presents a preliminary effort. We use in our work data from the biggest Internet auction in Czech republic aukro.cz. The aim is to extract the needed data and to create tree structured representation with the aid of Matlab programming system. The aim is to create a set of tools for visualization of analyses of online systems social networks that would enable among others the study of social interaction among sellers and buyers interacting within an online system. The communication within these systems proceeds as a rule under the situation when they are not in physical contact and hence do not know each other. They have therefore to rely on mechanisms implemented within prospective systems.

The seller can sell almost anything within the online electronic auction. A seller opens the bidding and stipulates an opening price and termination of auction. The buyer with the highest bid wins and obtains offered goods. In this paper we describe obtaining the needed data from online electronic auction aukro.cz and creating of social networks and their visualization.

1   Introduction

Social networks and their analyses are becoming quickly expanding field of research. Large quantity of data from large social networks are available from various online systems built on Internet infrastructure like online auction, blogs, P2 networks, knowledgesharing sites, collaborative filtering systems, online gaming, social networking sites, newsgroups, chat rooms etc. Social networking also refers to a category of Internet applications, which are aimed to help connect friends, business partners, or other individuals using a variety of tools. These applications like for example "MySpace" and "LiveJournal" are becoming increasingly popular.

Research in the area social networks created on Internet infrastructure is intensive. An instance can be hybrid representation of online activities [1], obtaining data from social networks of research community [2], semantic social network analysis [3] or marketing analysis [4], [5].

2   Data Visualization and Analysis

We visualize data obtained from aukro.cz using Matlab environment. We use in our work data from the biggest Internet auction in Czech republic aukro.cz. The aim is to extract the needed data and to create tree structured representation with the aid of Matlab programming system. The aim is to create a set of tools for visualization of analyses of online systems social networks that would enable among others the study of social interaction among sellers and buyers interacting within an online system. The communication within these systems proceeds as a rule under the situation when they are not in physical contact and hence do not know each other. They have therefore to rely on mechanisms

implemented within prospective systems. The aim our study is also to find out and to understand various patterns of custom behaviour.

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Online systems contain (with regard to their digital character) important information for visualization and for users behaviour analysis nesting within online system. Analyses will disclose interesting view on roles of different persons involved in network and their activities depending on a location in a network. Buyer is able to live in locality geographically completely different from seller but they may be closely connected within a social network. Also actor, who is the most visible, needs not necessarily to be the one who has the best location in the network. Analysis of user's behaviour may help us to understand potential trends and patterns of custom behaviour. The overall trends can be seasonal or geographical with some categories of products selling better than others for a few months, or in certain parts of the world.
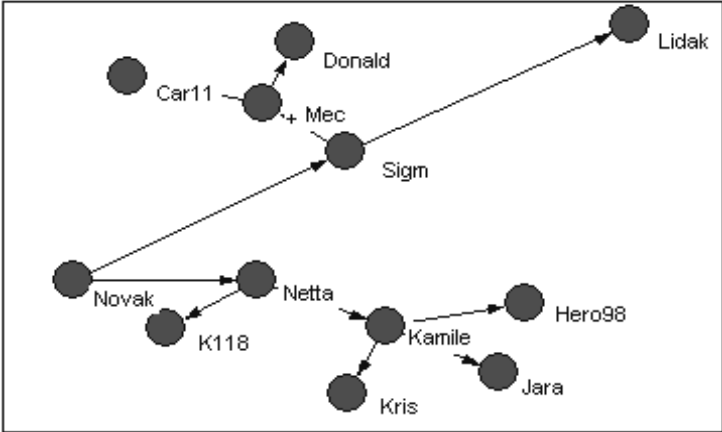

Fig. 1 Hierarchy visualization of auction

A screenshot of the resultant hierarchical structure is partially depicted in Figure 1. We performed node reduction with the aim to eliminate repetitive nodes and achieve a more efficient tree structure.

To identify popular categories for sold items, we assigned a code for each of the 8 categories obtained for 99 users. Figure 2 visualizes the category information using a force directed layout with 5 different colors assigned to each category.
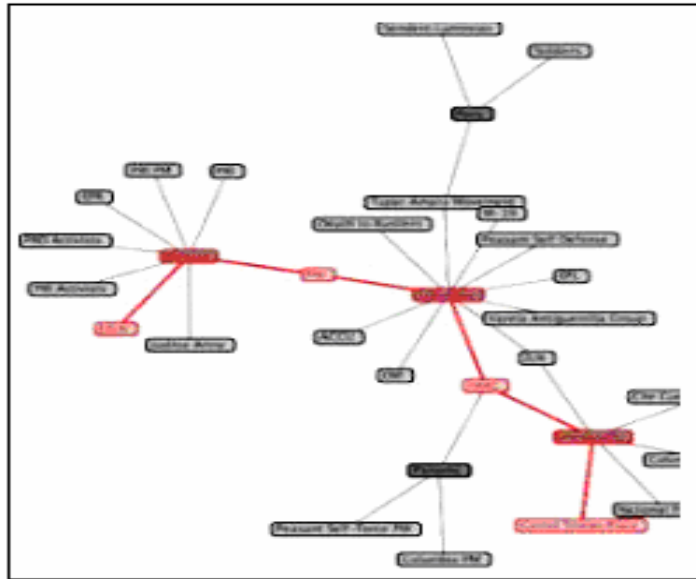
Fig. 2. Visualization – categories

It is interesting to note that some sellers sold completely different items from what they bought, while for some sellers almost all buyers bought items from the same category. From this analysis, we conclude that the three most popular categories of items sold are "Electronics", "Books" and "Clothing for the users under our current study. We can measure the degree of centrality for the top ten most active and visible actors in the network for studying their social interaction. We observe that the most active actors may not necessarily be the socially best-connected actor with regards to degrees, betweenness and closeness centrality measures. This analysis provides insight into users with the best location in the network under consideration. "Degree Centrality" varies between 10 and 82%, "Betweenness Centrality" varies between 5 and 78% and "Closeness Centrality" varies between 19% and 89%.

3   Conclusions and Future Work

Online auction can have information for visualizing and analyzing the behaviors of online customers through social networks. Visualization of tree hierarchies indicates different interaction patterns. Statistics obtained from online auction data reveal interesting insights into roles of various actors in the network and their measure of centrality. This paper presents a preliminary effort. Our future work will involve a more in-depth analysis of SNA tool for user behavior, and employing clustering mechanisms along with visualization to provide more intelligence.

We use at tests the MATLAB environment for network data representation (vertices, edges), for calculation of characteristic feature of networkss and for network visualisation. MATLAB comes in useful to for analyses of often patterns of consumer's behaviour for its range of visualization procedures and of matrix algebra that is the graph language on which the networks analysis is based.

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