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A Survey on Social Network Analysis and its Future Trends

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Abstract: A social network is a set of people or organizations or other social entities connected by set of social relationships such as friendship, co-working or information exchange. Social network analysis focuses on the analysis of the pattern of relationships among people, organizations,states and such social entities. In this paper a survey of the works done in the field of social network analysis is done and this paper also concentrates on the future trends in research on social network analysis.

Keywords: social network analysis, social network models, social network data, future trends.

I.INTRODUCTION

A social network is a social structure made up of individuals called nodes, which are tied by one or more specific types of interdependency such as friendship, kinship, common interest, dislikes, beliefs.

Social network analysis examines the structure of social relationships in a group to uncover the informal connection between people.Social network analysis is based on an assumption of the importance of relationships among interacting units.It indicates the way in which they are connected through different social familiarities ranging from casual acquaintances to close familiar bonds.[1] The social network perspective encompasses theories, models, and applications that are expressed in terms of relational concepts or processes. Along with growing interest and increased use of network analysis has come a consensus about the central principles underlying the network perspective. In addition to the use of relational concepts, we note the following as being important:

- Actors and their actions are viewed as interdependent rather than independent, autonomous units
- Relational ties (linkages) between actors are channels for transfer or "flow" of resources (either material or nonmaterial)
- Network models focusing on individuals view the network structural environment as providing opportunities for or constraints on individual action
- Network models conceptualize structure (social, economic, political, and so forth) as lasting patterns of relations among actors.

Most recently,SNA has become an important tool for organizational consultants seeking to understand connection between pattern and interactions and business outcomes such as job performance.

II.HISTORY OF SOCIAL NETWORK ANALYSIS

The summary of the progress of the social networks and social network analysis has been written by Linton Freeman[2]. Much early research in network analysis is found in educational psychology, and studies of child development. Network analysis also developed in fields such as sociology and anthropology. At the turn of the 20th century, Simmel was one of the first scholars to think in relatively explicit social network terms. He examined how third parties could affect the relationship between two individuals—and he examined how organizational structures or bureaucracies were needed to coordinate interactions in large groups.

III.REPRESENTATION OF SOCIAL NETWORK

A. social network data

According to Robert.A.Hanneman there is not anything about social network data that is all that unusual. Networkers use a specialized language for describing the structure and contents of the sets of observations that they use. Network data can also be described using the concepts of more familiar methods like cross sectional survey research. Conventional social network data consists of rectangular array of measurements. The rows of the array are the cases, subjects or observations.te column consists of scores on attributes or variables. The fundamental data structure is one

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that leads to compare how actors are similar or dissimilar to each other cross attributes.

Sources of data:
i.Questionnaires
ii.Direct Observation
iii.Written Records: archival or diary
iv.Experiments
v. Derivation

B.Types of social relations that can be represented through network data:

Kinship: brother of, father of
Social Roles: boss of, teacher of, friend of
Affective: likes, respects, hates
Cognitive: knows, views as similar
Actions: talks to, has lunch with, attacks
Flows: number of cars moving between point A and B
Transfer of material resources: business transactions, lending, etc.
Distance: number of miles between

C.Social network models

i.Matrix to represent social relation The most common form of matrix in social network analysis is very simple one composed of as many rows and columns as there are actors in the data set.The simplest and the most matrix is binary.That is if a tie is present ,a one is entered in a cell but if there is no tie ,a zero is entered. This type of matrix is the starting of network analysis and is known as adjacency matrix.

ii. Statistical model for analysis This type of models spansover70years.since,1970,one of the major directions in the field was to model probabilities between relational ties between interacting units such as actors. Extensive introduction to earlier methods is provided by Wassermann andf Faust [3].

iii.Using graphs to represent social relations Network analysis uses one kind of graphical display that consists of nodes to represent actors and lines or edges to represent relations or ties. When sociologists borrowed this concept of graphing they renamed the graph as "sociograms".

IV.INFORMATION RETRIEVAL ON SOCIAL NETWORKS

Web is an example of social network.social networks are formed by web pages by hyperlinks to other web pages. When analyzing social network, we will always deal with the web pages. So there are lots of similar methods or ideas as link analysis in information retrieval. Link-based techniques for analyzing social networks enhance text-based retrieval and ranking strategies.

Well known algorithms like page rank and HITS are used for retrieval of information from the web pages in social network structures. While PageRank and HITS were first presented in the same year (1998), PageRank has emerged as the dominant link analysis model for web search and mining. Like rank prestige, PageRank looks at the number of inlinks, together with the importance of these inlinks. It yields a static ranking, that is computed off-line, for each page, and does not depend on the search queries.

From the perspective of prestige, the following intuitions are used to derive the PageRank algorithm:

- A link from a page pointing to another page is an implicit conveyance of authority to the target page. Hence, the more in-links a page i has, the more prestige it has.
- Pages that link to page i have their own prestige scores. A page with a higher prestige score pointing to i is more important than a page with a lower prestige score pointing to i.
- Since a page may point to many other pages, its prestige score should be shared among all the pages that it points to.

There is something different of HITs from PageRank. HITS stands for hypertext induced topic search. Unlike PageRank, HITS depends on a query. When the user submits a query, HITS first expands the list of pages returned by the search engine and then produces two rankings of the expanded set of pages: authority ranking and hub ranking. An authority is a page with many in-links; it may have good content on some topic, and hence it is linked to by many. A hub is a page with many out-links, and serves as a good organizer of the information on a certain topic. The idea behind HITS is that a good hub points to many authorities, and a good authority is pointed to by many good hubs.

V.SURVVEY ON RELATED WORK

A survey on the recent work in the field of social network analysis reveals that the recent trend on social network analysis has various directions. L-hsien ting of national university of Kaohsiung worked in the field web mining and information retrieval on social network analysis[4],sun-wen jun has worked on analysis of blogospheres[5],Mingxin zhang of school of journalisn ,Wuhan University has worked

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paper name	year/conference	author	field of work
web mining techniques for online social network analysis	ieee,2008	l-hsien ting	web mining,association rule
social network analysis on blogospheres	ieee,2008	sun wen-jun,qiq hangming	link analysis
exploring adolescent peer relationships online and off line:an empirical and social network analysis	ieee,2009	mingxin zhang	Network analysis
analyzing online asynchronous discussions using content and social network analysis	ieee,2009	erlin,azizah abdul rahman	content analysis
social network analysis in it company	ieeee,2009	min zhu,wensong hu,zhou fang	network analysis
a social network analysis methods based on ontology	ieee,2010	tao li,he yang	ontology,relationship ontology
identifying user behavior in online social networks	socialnets'08 proceedings of the 1st workshop on social network systems	marcelo maia jussara almeida virgilio almeida	user behavior analysis

on adolescent peer relationship on online and off online network[6],erlin et.al worked on analyzing online asynchronous discussion using content[7],Min Zhu of Nanchang University has worked on application of social network analysis on IT companies[8],Tao Li of Wuhan University, china worked on social network analysis based on ontology[9],Marcela maia has worked on analysis the behavior of user on social networking sites[10],apart from the above mentioned works research in the field of spam behavior analysis is done[11].

VI.CONCLUSION AND FUTURE TRENDS

This paper provides a more current evaluation and update of social network analysis research available. Literatures have been reviewed based on different aspects of social network analysis. Survey on recent works in the field of social network analysis depicts that different research exposures are there in the field of social network analysis. Recent trends on research are in area of link analysis, dark web analysis, and spam behavior detection.

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