On Spectral Analysis of Signed and Dispute Graphs: Application to Community Structure

Abstract:

Social network analysis has received significant attention these days. To understand and utilize the information in a social network, researches have developed various methods to capture the structure and characteristics of the network .Most social network analysis approaches focused on *unsigned* graphs, where an edge between two nodes represents a presence of a relationship (e.g., trust or friendship) between two individuals. Among them, spectral graph analysis, which examines the eigenvectors of the graph Laplacian, normal matrix, or adjacency matrix, has been extensively researched. A variety of spectral clustering methods including RatioCut, normalized cut , and min-max cut have been developed.

Existing System:

Spectral analysis of signed networks from both theoretical and practical aspects. On the theoretical aspect, we conduct theoretical studies based on results from matrix perturbation for analyzing community structures of complex signed networks and show how the negative edges affect distributions and patterns of node spectral coordinates in the spectral space. We prove and demonstrate that node spectral coordinates form orthogonal clusters for two types of signed networks: graphs with dense inter-community mixed sign edges and *k*-dispute graphs where inner-community connections are absent or very sparse but inter-community connections are dense with negative edges. The cluster orthogonality pattern is different from the line orthogonality pattern (i.e., node spectral coordinates form orthogonal lines) observed in the networks with *k*-block structure. We show why the line orthogonality pattern does not hold in the spectral space for these two types of networks. On the practical aspect, we have developed a clustering method to study signed networks and *k*-dispute networks. Empirical evaluations on both synthetic networks (with up to one million nodes) and real networks show our algorithm outperforms existing clustering methods on signed networks in terms of accuracy and efficiency.

Proposed System:

In this paper, we have conducted spectral analysis for analyzing community structures of signed networks and show how the negative edges affect distributions and patterns of node spectral coordinates in the spectral space. Specifically, we have proved and demonstrated cluster orthogonality for two types of signed networks: graphs with dense intercommunity mixed sign edges and graphs with *k*-dispute structure. We have shown why the line orthogonality pattern does not hold in the spectral space for these two types of networks. On the practical aspect, we have developed a clustering method to study signed networks and *k*-dispute networks. We have demonstrated with both synthetic and real graphs that our approach can successfully analyze community structures of different network types and our algorithm outperforms existing clustering methods on signed networks in terms of accuracy.

Modules :

- Spectral analysis of signed graphs.

SYSTEM REQUIREMENTS

H/W System Configuration:-

Processor	-	Pentium –III
RAM	-	256 MB (min)
Hard Disk	-	20 GB
Key Board	-	Standard Windows Keyboard
Mouse	-	Two or Three Button Mouse
Monitor	-	SVGA

S/W System Configuration:-

Operating System	:	Windows95/98/2000/XP
Application Server	:	Tomcat5.0/6.X
Front End	:	HTML, Jsp
Scripts	:	JavaScript.
Server side Script	:	Java Server Pages.
Database	:	MySQL 5.0
Database Connectivity	:	JDBC