Chapter 6
Social Media Metrics in an Academic Setup

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ABSTRACT

Social media is perhaps responsible for largest share of traffic on the Internet. It is one of the largest online activities with people from all over the globe making its use for some sort of activity. The behaviour of these networks, important actors and groups and the way individual actors influence an idea or activity on these networks, etc. can be measured using social network analysis metrics. These metrics can be as simple as number of likes on Facebook or number of views on YouTube or as complex as clustering co-efficient which determines future collaborations on the basis of present status of the network. This chapter explores and discusses various social network metrics which can be used to analyse and explain important questions related to different types of networks. It also tries to explain the basic mathematics behind the working of these metrics. The use of these metrics for analysis of collaboration networks in an academic setup has been explored and results presented. A new metric called “Average Degree of Collaboration” has been defined to quantify collaborations within institutions.

INTRODUCTION

Man’s desire to quantify things is as old as the mankind itself. We derive great pleasure when we are able to represent something in terms of numbers particularly if the measurement at hand is of qualitative nature. Social networks have been around since time immemorial but they attracted attention of the sociologists only in the 1930’s (Cooley et al., 1997). Before the advent of computers analysis and understanding of large scale complex networks was almost impossible. The computational power of computers and their ability to store large amounts of data has provided the much needed impetus to the analysis and understanding of large scale complex social networks. These networks have attracted huge attention from the researchers and policy makers because they are being used for a variety of purposes.

DOI: 10.4018/978-1-5225-0846-5.ch006
In the recent past, online social networks have been used for political opinion making, discussing the pros and cons of a product or service, discussing events, etc. It has been observed that these networks have a great deal of impact on the strategy of political figures, political parties, organizations, industries, etc. because they have to adopt to the mood and requirements of the target audience as opinions are formed and revised collectively not individually.

In this contemporary world networks can be found in abundance and everyone talks about them (Katzmair, 2014). A social network is constituted by a number of units (nodes, actors, etc.) that are connected to each other by a defined relationship e.g. “alice cites bob”, “alice sends 5 email messages a week to bob”, “alice and bob use the same product”, “alice and bob belong to same organization”, etc. There are a few wrinkles—the units may be persons, organizations, cities, journal articles, or other types of entities; the relationships may be uni-directional or bi-directional; and the linking relationships may represent categorical relationships or intensity relationships. “alice cites bob” is a uni-directional relationship; “alice cites bob very often” is a uni-directional relationship recording intensity; “alice and bob are friends” is a bi-directional relationship; “alice and bob are close friends” is a bi-directional relationship recording intensity.

In simple terms a network is an organized collection of nodes or actors and their interconnections or relationships (Jin et al., 2006). Networks can be as simple as blood relations between two individuals or as complex as the World Wide Web. Such networks, where the relationships between actors have some sort of social bearing, are called as social networks. Examples of social networks include e-mail communication networks, economic or business networks, cooperative networks, academic networks. Though the type of link or relationship between actors in any of these networks may be completely different from those in others, they can still be analyzed using a multidisciplinary science called as Social Network Analysis (SNA).

Orgnet.com defines SNA as a tool for analyzing relationships and flows between various entities like people, groups, organizations, computers, URLs, etc. In social networks, nodes represent entities like people, groups, organizations, etc. whereas, the edges represent the relationships or flows between the nodes. Using SNA techniques one can have both a visual and a mathematical analysis of relationships in social networks. As a branch of sociology, SNA has emerged as a formal discipline that has borrowed a lot from mathematical notions of graph theory (Mika, 2007). The developments in SNA that we see today are an outcome of contributions from a multitude of disciplines like sociology, social psychology, anthropology, mathematics and computer science (Mika, 2007).

Study of the patterns of interaction and communication in collaborations between various actors has already attracted significant interest from scholars (Wagner & Leydesdorff, 2005a; Wagner & Leydesdorff, 2005b; Wagner & Leydesdorff, 2008; Luo & Hsu, 2009). Advances in data mining and recent developments in social network visualization software have facilitated the study and analysis of intensity and dynamics of these relationships in a visual or graphical manner (Luo & Hsu, 2009). Representation of interactions between entities in terms of nodes and edges i.e. graphs, where nodes represent entities and edges represents interactions, allows one to apply graph theory for the analysis and understanding of underlying collaborations (Luo & Hsu, 2009). Such a study is capable of finding and describing the interactions at micro, macro and universal level.

SNA defines actors and their interactions in quantifiable terms using a set of metrics commonly referred to as social network analysis metrics. Since the use of SNA is not limited to a particular field or type of network the choice of metrics is dependent upon the particular type of network. For example, in an online social network some of metrics are different from those used to model an academic social