

Discovering the influencers in a social network : A case study of Facebook-group of IT professionals

“Discovery is no longer limited by the collection and processing of data, but rather management, analysis, and visualization.”

- Damian Mingle

Introduction

Initiated in 2014 by Arun Kumar, an IT consultant by profession, XYZ is a Facebook group, which in a short span of time has garnered several thousand subscribers. The group is currently being used for discussing contemporary information technologies, sharing technical issues that the members face, IT tips and tricks, job opportunities etc. With the burgeoning activities in the group, the time and efforts invested on a daily basis by the group-owner have increased multifold. The owner / admin activities entail reviewing and approving the membership requests, moderating the discussion and ensuring that the members do not post any inappropriate content. While Arun is passionate about these group activities, considering the scale of operations, getting a paid professional assistance has become inevitable. In an endeavor to sustain the group activities, Arun was contemplating on monetizing the Facebook group, but on the other hand collecting membership fees or displaying advertisements explicitly involves risk of the group losing its credibility and activities being diluted. Considering all these aspects, Arun decides to embark on content marketing. With preliminary discussion with few IT vendors, Arun is confident of attracting advertisers but the key concern expressed by the prospective advertisers is the effectiveness of the content marketing. Further, to ensure that product or service being promoted is not always part of Arun's posts, it is important to identify few affiliates in the group who can advertise the products and services by incorporating relevant content in their posts. However, for content marketing campaigns to work as envisaged, it is important that the right people post the content at the right time in a



Copyright © 2017 Shri Dharmasthala Manjunatheshwara Research Centre for Management Studies (SDMRCMS), SDMIMD, Mysore. This case is published as a part of 'Cases in Management Volume 6 (2017)' with ISBN 978-93-83302-29-1.

The case writer(s) Mohamed Minhaj, Associate Professor - Systems, SDMIMD, Mysore, may be reached at mminhaj@sdmimd.ac.in. Author(s) have prepared this case as the basis for class discussion rather than to illustrate either effective or ineffective handling of the situation. This case is fictionalized and any resemblance to actual person or entities is coincidental. This publication may not be digitized, photocopied, or otherwise reproduced, posted, or transmitted, without the permission of SDMRCMS, SDMIMD, Mysore. For Teaching Notes please contact sdmrcms@sdmimd.ac.in.

right way. Against this backdrop, identifying who should post information about the product or services that is to be promoted on the Facebook group is a big question.

What are social networks ?

Social media are web-based communication tools that enable people to interact with each other by both sharing and consuming information (Nations, 2017) and the common features of social media sites include accounts, profile pages, friends, followers, groups, hashtags, new feeds and so on. While Social Media refers to the information that we actually share like an article, link or a video, social networking has to do with who our audience is and the relationships we have with them. Individuals and organizations use social media platforms to build social networks or social relations with others who share similar personal or career interests, activities, backgrounds or real-life connections. The Social networks can include friends, relatives, colleagues, customers, mentors and sometimes even complete strangers.

Social network features are central to many of today's computing applications. Many successful websites and apps use social networking features to appeal to their users, allowing them to interact, form social connections, post updates, spread content, and comment on other's posts. Social networking features are ubiquitous and are not only used by online social networks, such as Facebook and Twitter. For example, news reading, online education, music listening, book reading, diet and weight loss, physical activity tracking, and many other types of modern computing applications, all heavily rely on social networking (T Althoff, 2017).

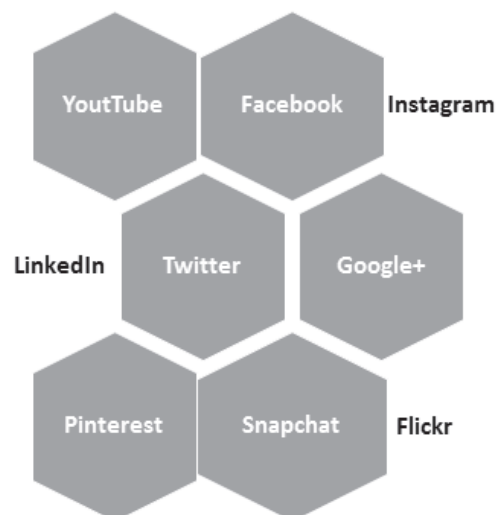


Figure 1 : Popular social networking sites.



Figure 2 : Key features of social networking platforms

Social networking is the practice of expanding the number of one's business and/or social contacts by making connections through individuals, often through social media sites such as Facebook, Twitter, LinkedIn and Google+ (Tech Target, 2017). While social networking has gone on almost as long as societies themselves have existed, the unparalleled potential of the Web to facilitate such connections has led to an exponential and ongoing expansion of that phenomenon.

Social networking platform enable the participant or member to contact any other member. In other cases, members can contact anyone they have a connection to, and subsequently anyone that contact has a connection to, and so on. Some services require members to have a preexisting connection to contact other members.

Can Arun use social networks for advertising?

Most social networking platforms have different schemes to facilitate advertisements. For example, Facebook with adverts , allows its users to create ads and target specific users of Facebook pages or groups. However, as Arun is not keen on displaying ads explicitly, some other form of advertisement had to be devised keeping in mind the concerns

of Arun, particularly regarding commercial ads depleting the credibility of the group. Considering these aspects, Arun decided to embark on Content Marketing.

Content marketing is a form of online marketing that revolves around the creation and sharing of material (content) rather than the sale or promotion of certain products or services. Content marketing is a subtle way to generate interest in a product, service, or business with the expectation that the interest will eventually pay off and lead to a sale down the road. (rootedmarketing.com, 2017)

Arun's conundrum and role of SNA

While Arun is ardent about the group activities, challenges posed by the scale of activities and non-commercial nature of the group had compelled Arun to look at some way of monetizing the group to ensure its sustainability. As collecting membership fee or posting explicit ads is not possible, Arun resorted to Content Marketing. Arun was successful in getting on board few IT vendors to advertise on the Facebook group, however for this model of advertising to be enticing, it was important that reach and the engagement level of content marketing campaigns is high. Further, to ensure that content about the product or service being promoted is not always part of Arun's posts, it was important to identify few affiliates in the group who can advertise the products and services by incorporating relevant information in their posts.

As a first step, identifying members of the group who have higher degree of influence on the group was required. The influence could be in terms of the member's posts being highly read and responded to in the form of comments and shares or the members having relatively more social connections in the network etc. While the group statistics available in the form of Facebook insights could aid in knowing "what" and "when" should something be posted on the group, discovering "who" should post requires a different process and approach. It is in this context, that Social Network Analysis (SNA) comes into picture.

What is Social Network Analysis (SNA)

Social Network Analysis seeks to understand networks and their participants and has two focuses: the actors and the relationships between them in a specific social context (Serrat, 2017).

The information revolution has given birth to a new economy structured around flows of data, information, and knowledge. In parallel the developments pertaining to information

technology, has made the web as a prominent channel for sharing of information. Consequently, new forms of communication channels like social networking portals have evolved. Social networks are enabling individuals, groups and organizations to share information, opinions and ideas. It is tying up people and organizations across borders and has made causes, protests and politics digital and social. In this backdrop, SNA plays an important role in understanding the networks and their participants to study the patterns of communication within the network, behavior of the individual and the network etc. Social network analysis is basically focused on uncovering the patterning of people's interaction (INSNA, 2017).

The ties, which are detected and interpreted using SNA could be pertaining to people, groups of people, organizations, and countries. SNA as a research discipline provides an approach to conceptualize and analyze relationship between people and groups, how these relationships arise and consequence of the relationships. The analysis is performed using established concepts like Density, Centrality etc., along with many metrics (Wikipedia, 2017).

Table 1 : Prominent metrics used for analyzing the Social Networks

Homophily	The extent to which actors form ties with similar versus dissimilar others. Similarity can be defined by gender, race, age, occupation, educational achievement, status, values or any other salient characteristic.
Multiplexity	The number of content-forms contained in a tie. For example, two people who are friends and work together would have a multiplexity of 2. Multiplexity has been associated with relationship strength.
Mutuality/Reciprocity	The extent to which two actors reciprocate each other's friendship or other interaction.
Propinquity	The tendency for actors to have more ties with geographically close others.
Density	The proportion of direct ties in a network relative to the total number possible.
Distance	The minimum number of ties required to connect two particular actors, as popularized by Stanley Milgram's small world experiment and the idea of 'six degrees of separation'.

It is evident in the scholarly literature pertaining to SNA that the key metric that is used for quantifying the “importance” or “influence” of a particular node (or group) within a network is **Centrality**.

What is used to measure the centrality (Important members of the network or influencers) ?
(Nooy, 2005)

Betweenness Centrality	Closeness Centrality	Eigenvector Centrality	Alpha Centrality	Degree Centrality
<ul style="list-style-type: none"> Deals with measuring the shortest paths 	<ul style="list-style-type: none"> More central a node is, the closer it is to all other nodes. 	<ul style="list-style-type: none"> Measures the influence of a node in a network based on the quality of connections 	<ul style="list-style-type: none"> Adaptation of eigenvector centrality with the addition that nodes are imbued with importance from external sources 	<ul style="list-style-type: none"> Measure the number of ties that a node has (in-degree and out-degree)

Approach used by Arun to discover the influencers in a social network (Facebook group)

The premise for the analysis done by Arun was that by visualizing the social group as a network and identifying the clusters and concentration (Centrality) of the network it would be possible to find members of the group that exert the most influence within the group.

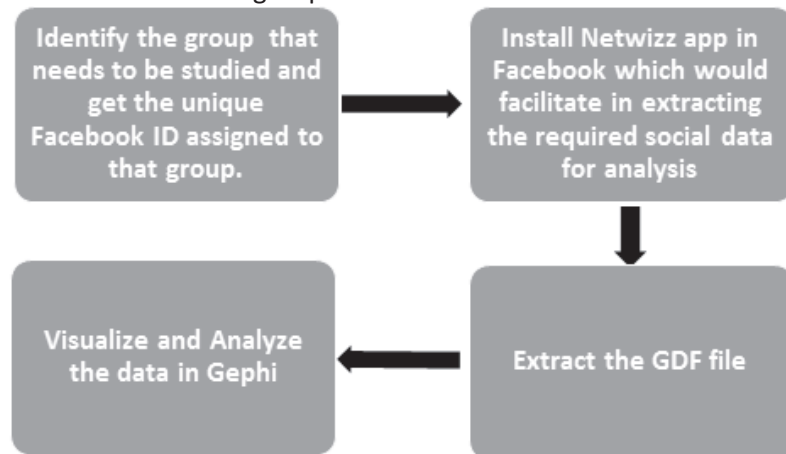


Figure 3 : The technical process involved in the study.

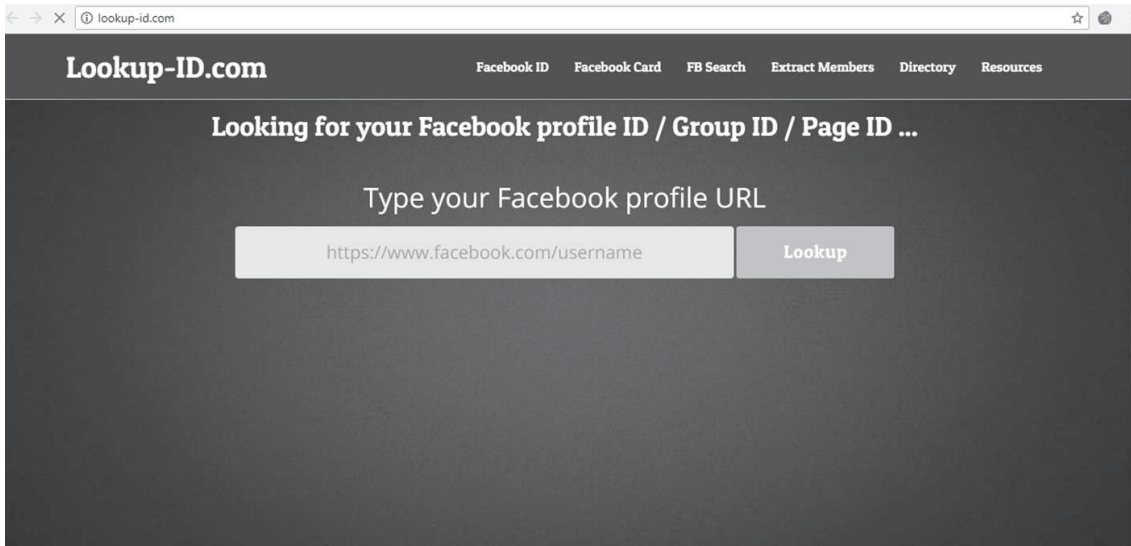
Tools used

Netvizz	<p>Netvizz is a Facebook App that extracts data from different sections of the Facebook platform - in particular groups and pages for research purposes. The output is given in both tabular format (tsv) and Graph (gdf).</p> <p>The App currently supports extraction of following types of data :</p> <ul style="list-style-type: none"> • Group Data • Page Data • Page Like Network • Page TimeLine Images • Link Stats
Gephi	<p>It is an open source software for graph and network analysis. It uses a 3D render engine to display large networks in real-time and to speed up the exploration. A flexible and multi-task architecture brings new possibilities to work with complex data sets and produce valuable visual results. It has several key features for interactive exploration and interpretation of networks. It provides easy and broad access to network data and allows for spatializing, filtering, navigating, manipulating and clustering (M., S., & M, 2009).</p>

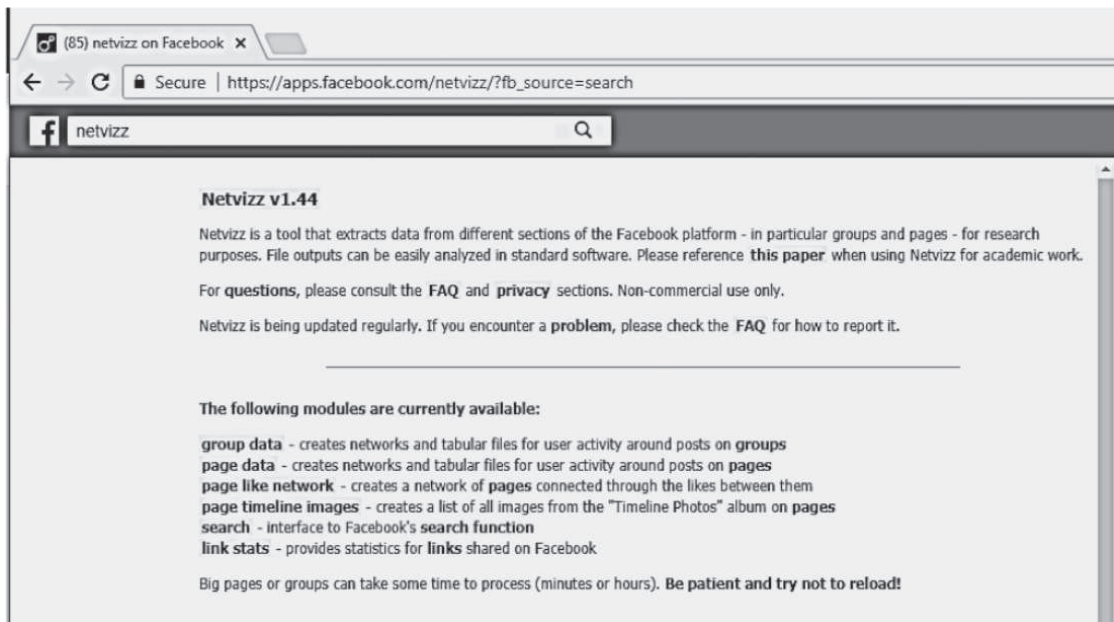
The technical process involved in extracting and analyzing Facebook's social data

Facebook has more than 2 billion monthly active users as of June 2017 (Wikipedia, 2017). Individuals and organizations are using Facebook by creating individual profiles, groups and Facebook pages. While using Facebook, the users are both consuming and creating humongous amount of data. Facebook has introduced many features to measure/analyze the activities on Facebook. For example, the Facebook Insights facilitates the Facebook group owners to track the usage of posts and parameters to decide what kind of content should be posted, when it should be posted, how it should be posted to maximize the engagement of the group members etc. However, focus of this study was not to study the content or statistics of the usage, instead the endeavor here was to study the connections that exist between the members of the group.

As a first step, the unique ID of the group under study was found using www.lookup-id.com.



To extract the data from Facebook, Netvizz app was installed in Facebook.



Further, in the group data module of Netvizz, the group id of the Facebook was specified and the network file (gdf format) was downloaded. This GDF file lists the members (nodes) of the group and the connections (edges) between them.

The following data is stored in the gdf file.

nodes are users

actions: sum of the number of posts, comments, and likes a user made;

made_posts: number of posts a user submitted;

made_comments: number of comments a user wrote;

made_reactions: number of reactions a user made;

rec_comments: number of comments a user's post(s) received;

rec_reactions: number of reactions a user's post(s) received;

rec_commentlikes: number of likes a user's comment(s) received;

Gephi, which provides an easy and efficient way to visualize the social data stored in GDF format, was used to analyze the Facebook group's data.

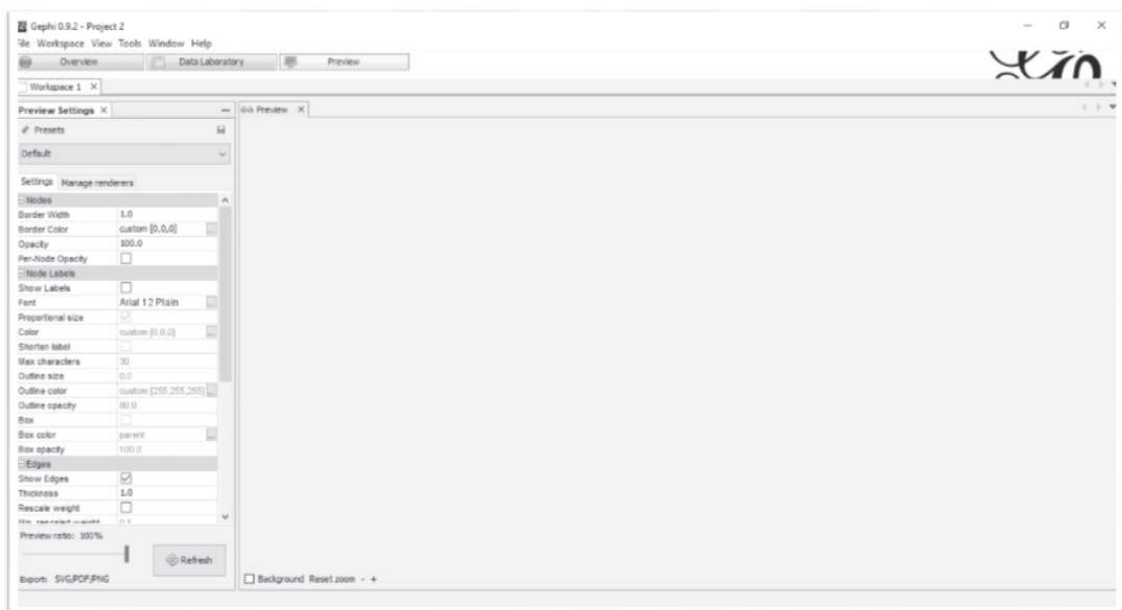


Figure 4 : Gephi's User Interface

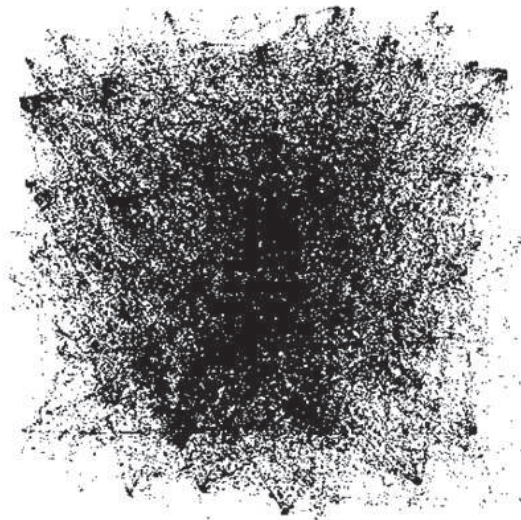


Figure 5 : Gephi's output of the social network data based on the default parameters

To produce a more meaningful visualization of this data, "Force Atlas" layout was applied. This layout pushes the most connected hubs apart from each other and positions the nodes connected to them in clusters around the hubs, producing a much clearer view of the community.

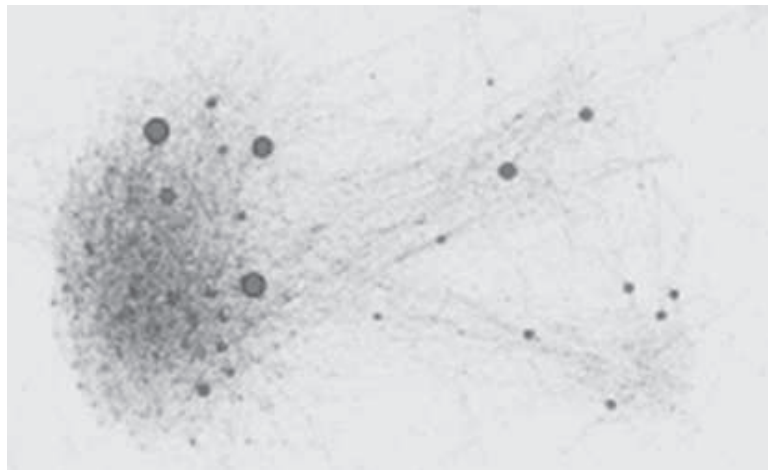


Figure 6 : Visual representation of the Social Network after applying "Force Atlas"

The key metrics for the graph were computed using the "Statistics" pane. Keeping in mind the focus of the study, the generated metrics like "Betweenness" were tweaked to measure the node's influence in the network.

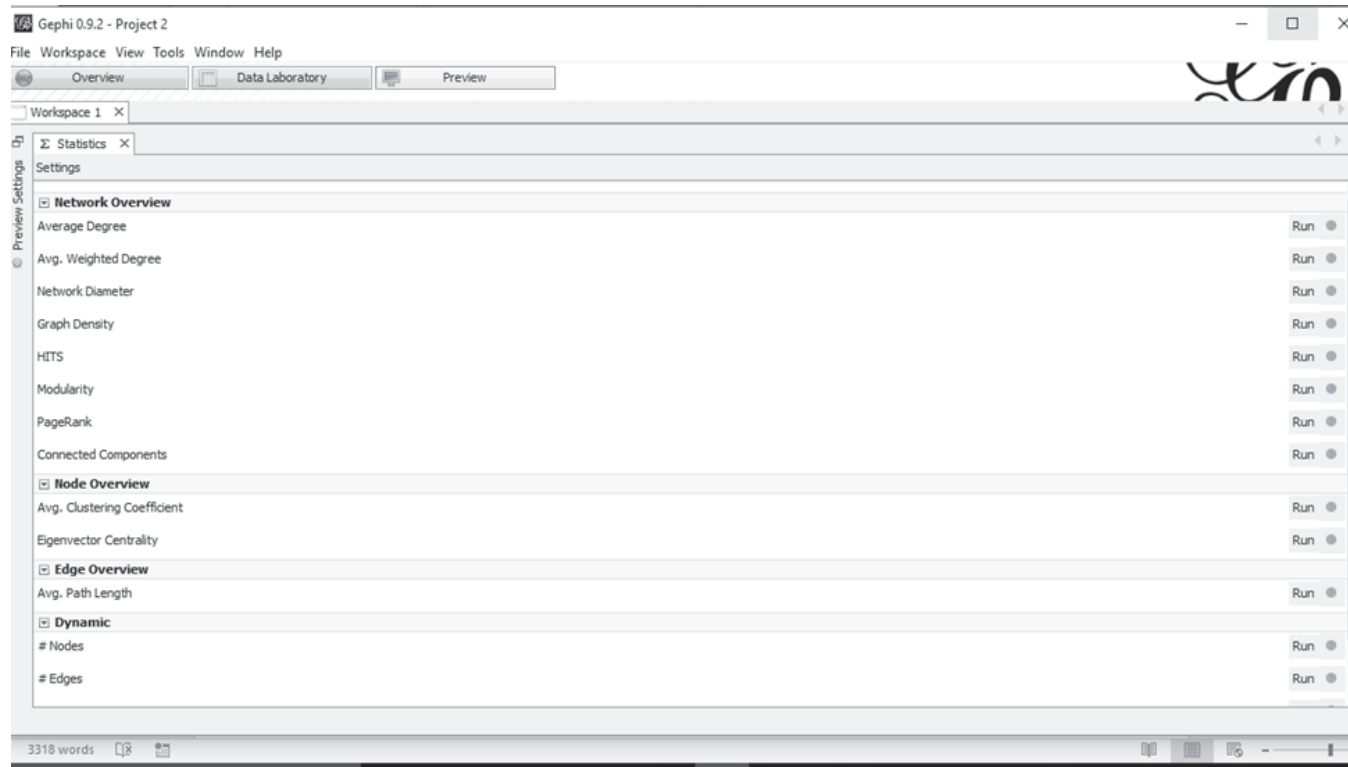


Figure 7 : Statistics pane in Gephi

Further, to make the communities within the network more visible the modularity was calculated. Modularity shows the clusters of nodes that are more densely connected together than with the rest of the network.

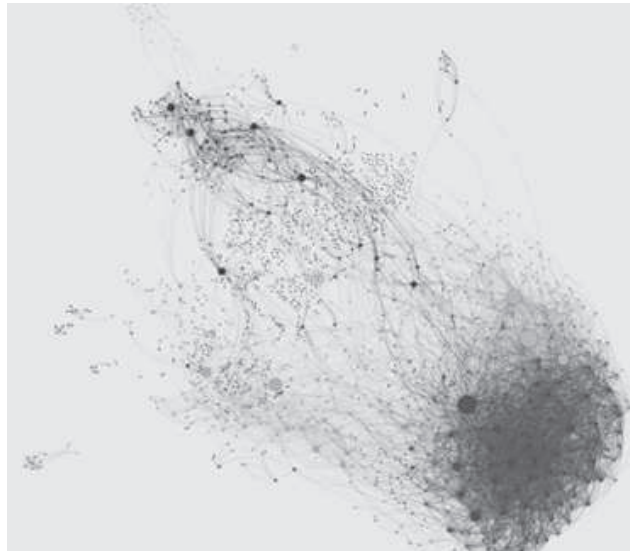


Figure 8 : Facebook group's Gephi visualization: Visualization depicting the community structure and the most influential nodes.

Note : With reference to Figure 8, while it is possible to show the actual names of the members of the network using “Display Text” option in Gephi, for privacy concern the same has not been enabled.

Content Marketing on Social Networks – Issues and Challenges

With the increasing popularity of the web for communication and collaboration, plethora of social networking platforms have been developed. The networks facilitated by these social media platforms have evolved as strong form of organization of human activity. Social networks are enabling individuals, groups and organizations to share information, opinions and ideas. It is tying up people and organizations across borders and has made causes, protests and politics digital and social. Content Marketing on Social Networks has a great potential in generating interest in a product/service and eventually leading to sales. However, it is important that the right people post the content at the right time in a right way and SNA has become a prominent approach in discovering these insights.

As far as the approach used by Arun to monetize the group activities is concerned, while content marketing and use of SNA to discover the influencers in the group appear to be promising, there are many questions that remain unanswered :

Will Arun be successful in continuing to entice advertisers considering the relatively less measurable form of advertising model followed by him?

Though subtle but with frequent promotions of the products or services in the group, will it hit the credibility of the group ?

Is it ethically right to display advertisements in a subtle way in an endeavor to retain the credibility of the group ?

References

(2017). Retrieved from Tech Target: <http://whatis.techtarget.com/definition/social-networking>

(2017, 09 10). Retrieved from INSNA: http://www.insna.org/what_is_sna.html

(2017, 09 27). Retrieved from rootedmarketing.com: <https://rootedmarketing.com/content-marketing-services/>

M., B., S., H., & M, J. (2009). Gephi: an open source software for exploring and manipulating networks. *International AAAI Conference on Weblogs and Social Media*.

Nations, D. (2017 , May 30). Retrieved from Lifewire: <https://www.lifewire.com/what-is-social-media-explaining-the-big-trend-3486616>

Nooy, W. d. (2005). *Exploring Social Network Analysis with Pajek*. Cambridge.

Serrat, O. (2017, May 23). *Springer Link*. Retrieved from https://link.springer.com/chapter/10.1007/978-981-10-0983-9_9

T Althoff, e. (2017). Online actions with offline impact: How online social networks influence online and offline user behavior. *Proceedings of the Tenth ACM International Conference on Web Search and Data Mining*, (pp. 537-546).

Wikipedia. (2017, 09 15). Retrieved from https://en.wikipedia.org/wiki/Social_network_analysis

Wikipedia. (2017). Retrieved from Facebook: <https://en.wikipedia.org/wiki/Facebook>

Wouter de Nooy et.al. (2005). *Exploratory Social Network Analysis with Pajek*. Cambridge.

