



A COMPARISON OF GRAPH THEORY AND SOCIAL MEDIA NETWORK

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ABSTRACT

The field of Mathematics plays a vital role in the various types of field. Many millions of people on an adjustable basis use online social networking (OSN) sites such as Facebook, Twitter, WhatsApp, and Myspace. Social media is very prevalent among young adults over the last decade. It has high influence among students. The social media and custom usage of social media has an unintended effect in the social communication and interpersonal relationships and self-concept among college students. Social Media Networks also has become a part of our life, in current years. In this preliminary work paper, our purpose is to analyze WhatsApp, considering a significant sample of data reacting relationships among subscribed users. In this paper, we would like to make a discussion on the positive and the negatives of using social media networks and then we make a comparison between Graph Theory and the social media networks.

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INTRODUCTION

Social media is frolicking an imperative role in circadian practices of communication with people all over the world. It has been extensively emerged among popular with young adults over the last decade. Growth in web-based technologies has widened the use of interactive social media that enables users to upload images and videos on the Internet. Social media networks are very much auxiliary to connect to our friends. Nowadays, whenever friends meet, they first confirm whether they use social media networks like Facebook, WhatsApp etc. Many find it as a God's gift since they are able to connect even to their childhood friends.

Communication-In Earlier Years

In previous years, there was not much communication facility. People were not able to get connected to their friends and relatives often. They felt it as a big process even to communicate for a little time. The cost of communication also was very expensive. Even for making a phone call, they found it as a tedious process. In earlier years, students were not able to clarify their doubts. They have to wait till the next day to come, for clarifying their doubts.

Communication-In Recent Years

Nowadays, Technology is moving on its rising slope. We find many communication networks. Within seconds, we are able to share our status, photos, and messages.

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In addition, we are also able to have group chats. In no time, we are able to communicate with many recipients at a time, with the help of groups. Not only for friendly chats, is it auxiliary in official chats also. Many companies form a group with their employees and using that they are able to share their communication content with ease.

Education also gets improved with the help of these communication networks. Many students, form a group with the classmates and use the group to share their ideas, homework, discuss their doubts and many other.

Related Work

The literature on Web (and social Web) data extraction is increasing: Ferrara *et al.* [9] provided a comprehensive survey of applications and techniques. In [8], Ferrara and Baumgartner developed some techniques for automatic wrapper adaptation.

A slightly modified version of that algorithm, relying on analysing structural similarities inside the DOM tree formation of Facebook friend-list pages, is the core of the agent used here to gather data. A common Social Network Analysis task is to discover if existing, aggregations and subsets of nodes playing similar roles or occupying a particular position in a network [6]. Some strictly connected problems are related to optimizing the visual representation of graphs [3]; for large social networks graphs is not trivial to find a meaningful graphical representation, because of the number of elements to display, and finding algorithms for the planar embedding of the graph, so as reducing (or eliminating) intersecting edges and improving aesthetic and functional characteristics of the graph

itself, is part of the solution [5]. Several Social Network Analysis tools have been developed during the last years: GUESS [1] focuses on improving the interactive exploration of graphs; NodeXL [16], developed as an add-in to the Microsoft Excel 2007 spreadsheet software, provides tools for network overview, discovery and exploration. Log Analysis [7] helps forensic analysts in the visual statistical analysis of mobile phone traffic networks. Jung [12] and Prefuse [10] provide Java APIs implementing algorithms and methods for building applications for graphical visualization and SNA for graphs.

Social Medianetworks

There are many social media networks. Using the social media networks, we are able to communicate by text, voice, pictures, and videos and so on. Many discovering it comfortable to use Facebook and WhatsApp. Each application has its own properties. We would like to make a comparison on mathematics with WhatsApp. At first going on to the comparison, let us see a few words about social media networks and WhatsApp.

Advantages of social media networks

- User friendly
- Connect to friends easily
- Share our thoughts and status
- Know our location
- Educational links and pages
- Used during emergency cases
- Helping hands can come forward even if they, not friends
- Gets addicted
- People may view our profile without permission
- Health issues

Whats APP

It is an application, which can be downloaded, either in mobile or on the desktop. Once we download, we can start using giving our personal data like the phone number. It is a user-friendly application. There are no restrictions on the number of messages or pictures shared. It also gives us privacy statements, like hiding the profile picture, hiding the status etc. It also gives the option to check whether the recipient has viewed the message or not. We can also see whether the person whom we text are online or not. We can block the users if they are not on our interest list. It has many advantages of this type.

Advantages of WhatsApp

- User friendly.
- Less time for communication.
- Good privacy service.
- Online calling facility.
- Can set lock to the application.
- Easy to use, even a novice mobile user can use it.
- Instantly send message to anywhere in the world.
- It do not have any advertisements on display screen.
- WhatsApp calling made it more reliable.

Disadvantages of WhatsApp

- Messages can be sent only when the number is in our phone book.
- Unknown persons also can communicate.

- We can't send message to our own number.
- Health issues.
- Misuse of profile pictures.
- It can be annoying sometimes due to constant messages.
- Our profile picture is visible to every person having our contact number.
- There is risk, your spouse/girlfriend/boyfriend may read the messages.

Graph Theory

As we all know, showing any data in pictures gives clear understanding than the usage of words. In general, pictorial representation has been referred as graphs. Graph Theory plays a major role in each and every field. In Computer Science Engineering, it has its vast application. It plays a major role in both software and hardware usage. For Example, in software, it is used in data flow diagram, graphical design, network designing. In hardware, it is used in data structure, image processing, web designing etc.

Graph theory terminology

Graph: A graph-generally denoted $G(V,E)$ or $G=(V,E)$ – consists of the set of vertices V unitedly with a set of edges E . The number of vertices in a graph is normally denoted n while the number of edges is normally denoted m [1].

Example: The graph given in the figure-1 has vertex set $V=\{V_1,V_2,V_3,V_4,V_5,V_6\}$ and edge set= $\{(V_1,V_2),(V_2,V_3),(V_2,V_6),(V_3,V_5),(V_3,V_4),(V_4,V_5),(V_5,V_6)\}$.

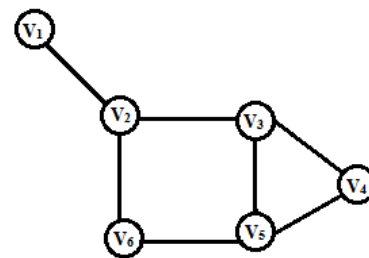


Figure 1 Simple Graph

Edge: An edge is a line at which vertices are connected in the graph. Edges are denoted by $E=(U,V)$ it is a pair of two vertices.

Null graph: A graph $G=(V(G), E(G))$ is a Null Graph if there are no edges in the graph, that is $|E(G)|=0$.

Complete graph: A simple graph $G=(V, E)$ with n mutually adjacent vertices is called a complete graph G and it is denoted by K_n or A simple graph $G=(V, E)$ in which every vertex in mutually adjacent to all other vertices is called a complete graph G .

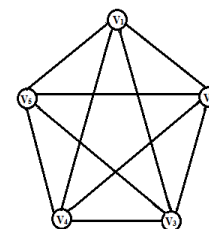


Figure 2 A Complete Graph

The Degree of a vertex: Number of edges that are incident to the vertex is called the degree of the vertex.

Regular graph: In a graph if all vertices have same degree (incident edges) k than it is called a regular graph.

Cycle graph: A simple graph $G = (V, E)$ with n vertices ($n \geq 3$), n edges is called a cycle graph.

Directed graph: A directed graph in which each edge is represented by an ordered pair of two vertices, e.g. (V_i, V_j) denotes an edge from V_i to V_j (from the first vertex to the second vertex).

Disconnected graph: A graph G is said to be disconnected if there exist two vertices in G such that no edge in G has those vertices as endpoints.

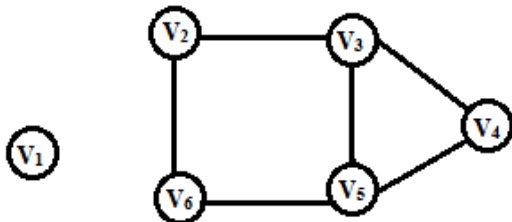


Figure 3 Disconnected Graph

Comparison of WhatsApp & Graph Theory

Communication needs both sender and receiver. WhatsApp uses two types of communications, like, single sender many receivers. Many sender single receiver, many senders many receivers and so on.

In WhatsApp, first, it shows the contact of the persons who are all using WhatsApp like us. It can be compared with the set of all vertices. Let us for our example consider there are 5 persons using WhatsApp. Then, the graph consists of 5 vertices as shown in Figure - 4.

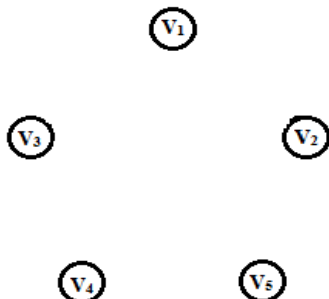


Figure 4

When all the persons are idle, there is no communication and we can compare it to a null graph, as shown in Figure - 4.

When two persons are in chat, it means they are connected. In graph theory, we compare it to an edge. When two vertices are joined, we say there is an edge in a graph. For example, we consider an edge between V_1 and V_2 , as shown in Figure - 5.

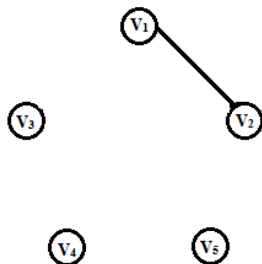


Figure 5

When all the persons need to communicate at a time in WhatsApp, a group is formed and used. It can be compared to a complete graph. A complete graph is a graph in which every pair of vertices is connected by an edge, as shown in Figure - 6.

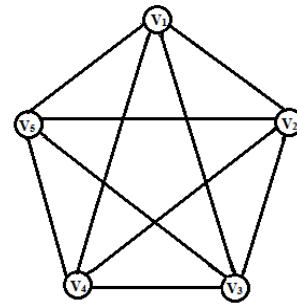


Figure 6

- Two vertices which are incident with a common edge are said to be adjacent. In a complete graph given in Figure -6, every vertex is adjacent.
- In WhatsApp, in a group chat, every person is communicable to every other person. It again can be referred to a complete graph as shown in Figure -6.
- Again referring to a group chat of 5 persons, every person is communicable to 4 other persons. In Graph Theory, it can be referred to a regular graph, in which every vertex is some same degree. Figure -6 is again an example of such regular graph.
- Once again, referring to a group chat of 5 persons, suppose one person communicating with the second person, and in turn the second person to the third person, who in turn communicates to the first person, then there is only communication between three persons and the other two persons are idle. This can be referred to cycle graph with 3 vertices as shown in Figure- 7.

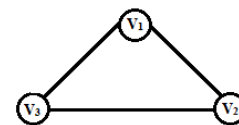


Figure 7

Again taking note of the situation stated above, it can be referred to a directed graph as shown in Figure -8.

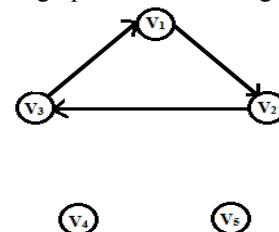


Figure 8

Once again comparing to the above-said situation, consider the remaining other two persons communicating among themselves, in the graph. This can be described to a disconnected graph, as shown in Figure -9

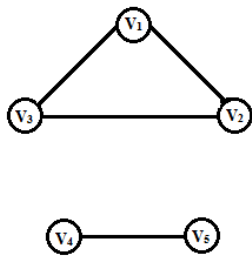


Figure 9

CONCLUSION

In this preliminary work we focused on the probability of extracting relevant information about relationships from WhatsApp. Thus the WhatsApp application has been discussed and also, compared with the concepts of Graph Theory.

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