

Visualization for Analysis of Social Networking, Models and Techniques: A Review

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ABSTRACT: In this paper, we have reviewed several social networking sites, evolution and background and significance of social media. Social networking is used as platform for various applications like: government, business, educational, political, dating and matrimonial, etc. Motivation is to examine adversarial networks and represents the activities observed by analyser. Additionally we've examined social network model and operations performed in it along with simulation and close degree algorithm, Adversarial Network analyser and analysis of vulnerabilities of an organization analysed. We examine the types of posting on social media websites and influence of posting data and privacy concerns of Facebook and twitter users. This study indicates the different concerns of users regarding posting information and its influences of user based privacy concerns. In addition we discussed several classification and clustering techniques used for data mining in online social networking sites and the market targets and parameters and analysis of different variables as per the usage of SNSs.

Keywords: Social Networking, Several Classification, online social networking and market targets.

1. INTRODUCTION

In past couple of years, online social networking sites become quickly widespread. The primary idea to essay the social networks is to examine and understand the development and growth of structure of social network over the time [1]. Understanding the random topological guide of social systems is essential for a wide range of uses for example, business, security, criminal examination, and so on [2].

1.1 Social Media

Fundamentally, Social system is a gathering of individual or associations that offer a social class that offer interests and thought and making new companions, such as systems administration gatherings. Social media is a sequence of multiple websites created for public that allows them to share content rapidly and effectively [3]. It encourages individuals to remain associated with family and companions. Dissimilar to customary media for the most part made by few individuals, online networking sites comprises of boundless clients. A few interpersonal organizations normally utilized now-a-days resemble: (i) Facebook – most prevalent site on web. It's client's goal to associate with family and companions' on the web and sharing pictures, films and so on. (ii) Classmates – site utilized for interfacing secondary school graduated people and be in touch for future reunions. (iii) Instagram – an adaptable photograph sharing administration accessible for all stages. (iv) Google – It's a current interpersonal interaction application from google. (v) Pinterest – a sharing administration permits everybody to share their manifestations and accumulations.

1.2 Significance

Nowadays social media is used by several businesses to promote themselves. Marketing on social media validates the

brand and helps to communicate with consumers and get loyalty customers. Online social networking sites became integral part of everyone's life. Online site helps us to share data or content with our family and friends, promotes business, getting in touch with near ones, advertising, communications, online shopping of our day to day essentials, etc. Social media accommodates everyone even if they are out casted from society. Nowadays media is playing pivotal role to create and shape the public opinion and strengthening society.

1.3 Reasons for using social media

Bertot et al(2010) [8] framework used to classify the interactions of social media by overlapping the types of crowdsourcing solution and co-production along with public health services via comment, feedback suggestions on social media.

- **Transparency and accountability:** It mainly includes Twitter, Facebook or YouTube to post data about the organization like: staff members, services, etc. to give updates of current activities i.e. job openings, news, events, etc. to increase awareness of Open Data resources.
- **Democratic participation:** it's cited because public health organizations uses social media as e-government. In Japanese study it's found that maximum number of online signatures for campaign to oppose reforms to reimbursement of regular medicines.

2. LITERATURE REVIEW

The network theory and the concept of social network had been discussed in written since 1930s. Initially and originally, the vague idea of networks was conceived earlier than 1930s, but

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introduced in 1934, when Moreno created the first idea of sociogram, which is graphical representation of people and their relations. He started on the premise of network science and stoichiometry, which later evolved as analysis of social network. The research on sociogram organized a method to connect the entities graphically as per their relationship and set a base for network direction and mutuality of relations. The research on sociogram, later progressed as social network, as introduced by Barnes in 1954. [4] The first official social networking site "SixDegrees.com" was launched in 1997, permits users profile creation and making friends. Since 1997 till 2001 several communities initiated for integrating profiles and friends articulation [5].

Sitaram Asur, et al., (2010) [9] demonstrated that how the content of social media can be used to predict real-world outcomes. As of late, online networking has turned out to be pervasive and essential for informal communication and substance sharing. But, the substance that is created from these sites remains to a great extent undiscovered. Specifically, we utilize the prattle from Twitter.com to figure film industry incomes for motion pictures. We demonstrate that a basic model worked from the rate at which tweets are made about specific themes can outflank advertise based indicators. Additionally, they exhibit how slants extricated from Twitter can be additionally used to enhance the determining energy of online networking.

Jie Yin, et al., (2012) [10] focussed to analyse Twitter messages occurred during natural disasters, and shows how natural language processing and data mining techniques are utilized to extract situation awareness information from Twitter. Online networking sites, for example, Twitter, offer a rich wellspring of ongoing data about genuine occasions, especially amid mass crises. Filtering significant data from online networking gives valuable knowledge into time-basic circumstances for crisis officers to comprehend the effect of dangers and follow up on crisis reactions in a convenient way. They exhibited key important methodologies that we have examined including blasted recognition, tweet sifting and grouping, internet bunching, and geotagging.

Kaveri Subrahmanyam, et al., (2008) [11] surveyed college students responded, in person and online, to questions about their online activities and closest friends in three contexts: social networking sites, instant messaging, and face-to-face. Social networking sites (e.g., MySpace and Facebook) are popular online communication forms among adolescents and emerging adults. Results proved that participants generally used Internet, particularly SNSs, to connect with family members and friends. Thus, there was overlap between participants' online and offline networks. Although, the overlap was imperfect; the pattern suggested that emerging adults may use different online contexts to strengthen different aspects of their

offline connections. Information from this survey is relevant to concerns about young people's life online.

Daria J. Kuss, et al., (2017) [12] presented 10 lessons learned concerning OSNSs and addiction based on the insights derived from recent empirical research with new insights into online social networking and addiction. SNSs have gained increasing popularity in last decade, with individuals engaging in SNSs to connect with others who share similar interests. The perceived need to be online may result in compulsive use of SNSs, which in extreme cases may result in symptoms and consequences traditionally associated with substance-related addictions. These are: (i) Facebook is only example of SNS addiction; (ii) social networking is eclectic; (iii) social networking is manner of being; (iv) individuals can become addicted to using social networking sites; (v) social networking and social media use are not the same; (vi) fear of missing out (FOMO) may be part of SNS addiction; (vii) smartphone addiction might be part of SNS addiction; (viii) nomophobia may be part of SNS addiction; (ix) there are sociodemographic differences in SNS addiction; and (x) there are methodological problems with research to date.

Jaroslav Bukovina, (2016) [13] examined economical and technical point of view of social media data. They presented overview of research related to connection between capital markets and social media. Theoretical reasoning of such connection is mainly defined by behaviour finances which enlarge the standard model of well-planned markets and observes less rational factors like sentiments of investors as powerful pricing asset. Additionally the theoretical construction of communication mechanism and social media. They have summarized the main discovery in such field and defined the future challenges.

3. MOTIVATION

The social network examination and representation of adversarial systems is capable technique for understanding the system and monitoring significant data about system as it advances and turns out to be more characterized. Current occasions and political weights put a huge efforts on research exertion to comprehension of adversarial systems and their IDs. This integrated with fame of social network examination has made a system driven investigation of these systems fascinating and valuable. All through the study we look at enabling clients to take mock test for knowledge about social events on correspondences and people engaged with conceivable adversarial system and monitor data while picturing it and performing factual investigation. We presents representation tools designed particularly to style data captured by knowledge centres that permits user for data storage and represent them as modifications [4].

3.1 Visualization for Analysis

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The perception stage ANA provide capacity to enter in information given. This statistics entry is essential for accounting and examination however the instrument provides extra features. Despite of maintaining present information as it exists ANA keeps a past filled with all the entered information as sequence of occasions. An interface to permit the insight reports to be moved back to specific state in time and view its development from that point gives a film like perception of system. ANA encourages social network analysis estimation to indicate how different entities about system have developed.

4. TECHNIQUES

Several techniques used in social media are:

- **SVM:** It's a Support Vector Networks which are supervised learning methods to study statistics and differentiate patterns. It is class of learning machine which use support vectors and kernels for learning. The kernel machines provide a framework adapted to different tasks by choosing appropriate kernel function. SVMs can also achieve non-linear classification using Kernel trick. [14]. The main idea of SVM is to find the optimal extrication hyper plane such that error for hidden patterns is minimized.
- **PCA:** Principle Component Analysis is connected to reduce the measurements of inputs of data when the measurements of the input are broad and segments are extremely related. PCA decides a more diminutive arrangement of fake factors that will speak to the fluctuation of an arrangement of observed variability. PCA is the technique used, that accurately identifies significant deviation from normal users. PCA uses three input features to capture user behaviour in OSN such as: temporal, spatiotemporal and multiple features. PCA also shows robustness as detection accuracy does not change with unique choices of k (principal component) value [15].
- **Naives Bayes:** With a conditional independency assumption that all variables A_1, \dots, A_n in a given category C are conditional independent with each other's given C .

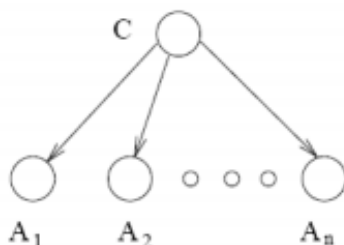


Fig 1.9.1: Naïve Bayesian network [16]

C is the parent node and A_1, \dots, A_n are children nodes. As A_1, \dots, A_n are conditional independent with each other's

○ .

given C , we have $P(A_i | C, A_j) = P(A_i | C)$ [3, 4]. In a probability inference task, our goal is to calculate the probability of a hypothesis C holds given conditions that data A_1, \dots, A_n have been observed, which is $P(C | A_1, \dots, A_n)$ [2, 3].

- **Artificial Neural Network:** ANN is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key component of this worldview is the novel structure of the data handling framework. It is made out of an expansive number of much interconnected preparing components (neurons) working as one to take care of particular issues. Neural systems adopt an alternate strategy to critical thinking than that of regular PCs. Neural networks process information in a similar way the human brain does [17]. The network is composed of a large number of highly interconnected processing elements (neurons) working in parallel to solve a specific problem.

5. APPLICATIONS OF SOCIAL NETWORKING SITES

Social networking has become wide area for both social and business purposes. Social networking became remarkable target in several fields as discussed below [18]:

- **Social Networking Websites:** these are internet based social media applications to stay in touch with family, friends, classmates, clients, etc. People used to shares pictures, sending messages, videos to stay connected.
- **Business Applications:** It is used in enterprises to connect with people at low cost. This could be useful for small businesses and entrepreneurs looking forward to expand their business. Since it is operated globally its latest trend of socializing with public through advertisements and reviewing their opinions to improvise quality of products.
- **Educational Applications:** majority of students explore the details of their relative topic online. Social networking supports the foster relationship among student and teacher by providing online classrooms, educational blogs, chat and discussion threads, etc. Content sharing and rating feature is available on these applications.
 - Course Management System: It's an integrated platform constitutes of several sequences web tools to enhance various course management related activities and procedures
 - Hybrid Course: It's a combination of traditional teaching and e – learning entities. Teachers chose this blended technique by using CMS tool to provide additional study material to students

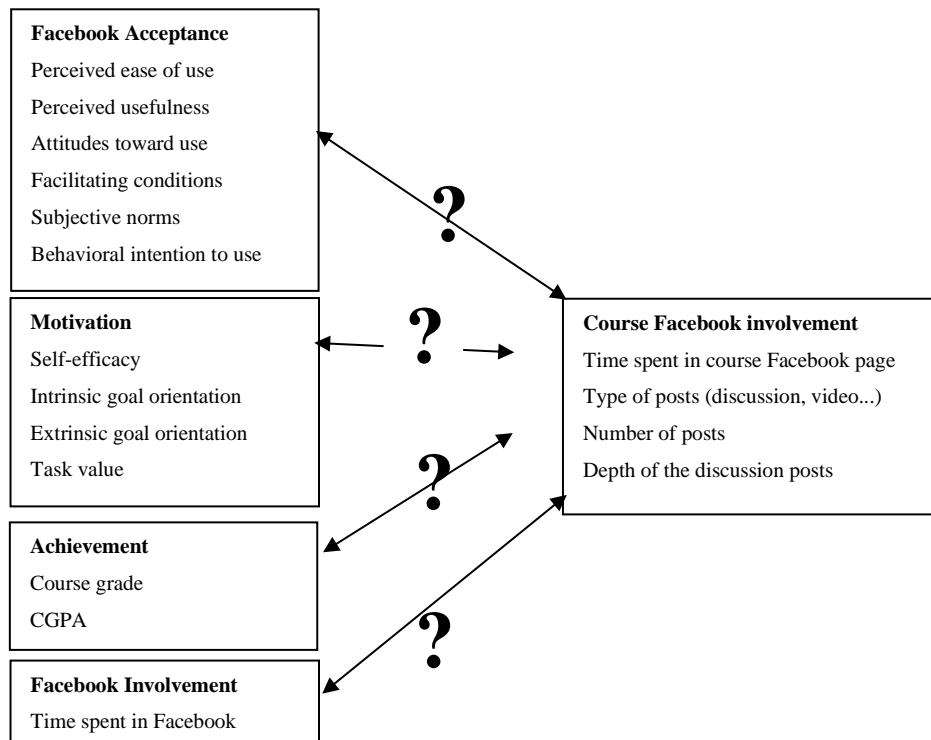


Figure 4.1: Related Research Questions [19]

Table 4.1: Distributions as per Courses [19]

Enrolled Courses	Number of Students			Range	
	Female	Male	Total	Age	Enrolled Credits
Only CTIS 151	15.4 % (2)	84.62 % (11)	13	20 -28	10 – 25
Only CTIS 163	14.3 % (1)	85.71 % (6)	7	19 – 22	8 – 22
Both CTIS 151 & CTIS 163	9.1 % (2)	90.91 % (20)	22	19 – 25	12 – 23
TOTAL	11.9 % (5)	88.1 % (37)	42	19 – 28	8 – 25

- **Finance Applications:** using virtual currency promotes the financial trades globally. Online sale purchase of commodities is possible due to social networking.
- **Dating Applications:** individuals communicate and sharing personal details internally to make relations, that can be long term, short term or one time relation. Using that information several dating apps as well as matrimonial sites are available online, where users create their profile to communicate and meet the person of interest.
- **Medical and Health Applications:** Social networking is also embraced by health care professionals to manage the institutional knowledge and highlight individual physician and practitioners. These applications are appearing to help its members with several mental and physical ailments. Sober Circles are created to help persons in recovery from

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addictions habits by communicating with each other which leads to encouragement of others related humans. Several groups concentrate on exercising and share their workout videos for others.

- **Political Applications:** Currently social networking websites are used for social and political movements. Facebook, twitter plays a pivotal role in connecting people to the Egyptian evolution, where social websites used as a platform to people featuring related updates. In 2008, in Barrack Obama’s election campaign, social media was incorporated as a winning strategy.
- **Crowdsourcing Applications:** It’s a platform for crowdsourcing like contests, charity functions, professional freelancing, fund raising start-ups which occurs offline also.

6. SOCIAL NETWORK MODEL

Simulation of social networks requires the development of model comprising system for addition of new entities and removal of old entities and adding or removing edges between old entities. A sample network has N_o has m_o nodes. The size of network is denoted by $N(t)$, node denotes by i , in-degree of node by $k_i(t)$, close degree by $a_{ig}(t)$ between node i and node g at time t . To get comparing the special connection likelihood and the anti-preferential connection likelihood keeping in mind the end goal to build up a preview of the informal organization at time t . Every time following operations performed [20]:

- Begin with small number (m_o) of nodes, every time a new node added with $m(m \leq N(t))$ edges joined to m nodes. The fresh node g connect to existing node i with preferential probability in network.

$$\prod(kkii) = \frac{kii(tt) + aiigg(tt)}{\sum_{jj=1}^{nn-1} (kjj(tt) + ajj gg(tt))} \dots\dots\dots(i)$$

- L fresh edges between old entities generated: Node i chosen as end of edge with preferential attachment in (1).
- C old links are deleted: node I chosen as end of deleted link with anti-preferential attachment:

$$\prod^*(kkii) = \frac{1}{(NN(tt)-1)} (1 - \prod(kkii(tt))) \dots\dots\dots(2)$$

E old entities are deleted: discarded the node i with anti – preferential attachment.

$$\prod^{**}(kkii) = \frac{N(tt) - N_{min}}{N(tt)} (1 - \prod(kkii(tt))) \dots\dots\dots(3)$$

N_{min} is least value of system. Nodes might be deleted when $N(t) > N_{min}$.

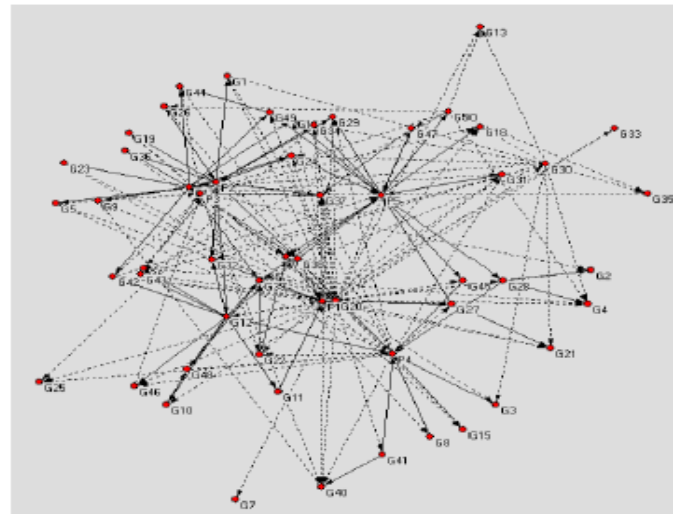


Figure 6: Topology map of social network in t1 [20]

6.1 Simulation Algorithm

Here, the primary social network algorithm and parameters were discussed. Nodes and relation of network, topology map was explained as graph $G(V, E)$, where G is graph or network, $V = \{v_1, v_2, \dots, v_n\}$ is non empty set nodes and E is set of edges.

Initialization Network

The model of initial network was derived from sample of network. Due to which network simulations are close to real surroundings. It proposes an inventive subgraph examining method based on the Metropolis calculation to survey the level of consistency with chart properties. These techniques have concentrated on the essential properties of guide, for example, relationship quality between hubs. A chart based stratified irregular examining calculation for creating an example of existing system.

6.2 Close Degree Algorithm

A close degree to mean hubs’ nearby degree. A hub has diverse close degrees to various hubs at time t . It changes over the time and exists on the whole hubs. A few specialists have contemplated relationship quality between hubs with a specific end goal to partition system or expectation examination. By theme based historical data mining, we can obtain the related factors and their weights in the social network. These factors and weights decide the close degree between nodes. Let $a_{ij}(t)$ be the close degree between node i and node j at time t , the f_k factor based on a topic’s social network at time and the weight of f_k . The close degree is calculated as the following:

$$a_{ij}(tt) = \sum_{k=1}^n (f_{kk} * W_{kk})$$

6.3 Adversarial Network Analyser

To meet the data set necessities a graph representation tool was created to control simulated Adversarial Network. The analyser (ANA) is java application, which permits user to input new

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connections on the graph and represents current intervals. The component most regularly utilized as a part of ANA is the utilization of chart perception through Nodes and Edges. It gives library capacities to appropriately render and lay out the system structure. The ANA is simple to utilize and programming accessible and perform numerical investigation and exhibits majority of performers alongside the gatherings they have a place in.

Informal community examination has been a standout amongst the most valuable apparatuses in breaking down ill-disposed associations, i.e. psychological oppressor organize. It can discover key faculty and inserted groups. Additionally, it evaluates the qualities, for example, level of centralization and levels of chain of importance, of the associations. For example, Krebs [21] pictured the fear monger organize in charge of 9/11 assault, and he figured centralities of psychological militants. After the essential examination both the surmised C2 structure and unique informal organization are explained in [22].

6.4 Social Network Analysis to find Vulnerabilities of an Organization

Table 6.4: Meta matrix dataset on Terrorist group [22]

	Terrorist	Expertise	Resource	Task
Terrorist (17)	Social Network (0.147)	Information Distribution Network (0.095)	Resource Distribution Network (0.088)	Task Assignment Network (0.126)
Expertise (8)	-	Not used	Not used	Required Information Network (0.048)
Resource (8)	-	-	Not used	Required Resource Network (0.076)
Task (13)	-	-	-	Tsk Precedence Network (0.121)

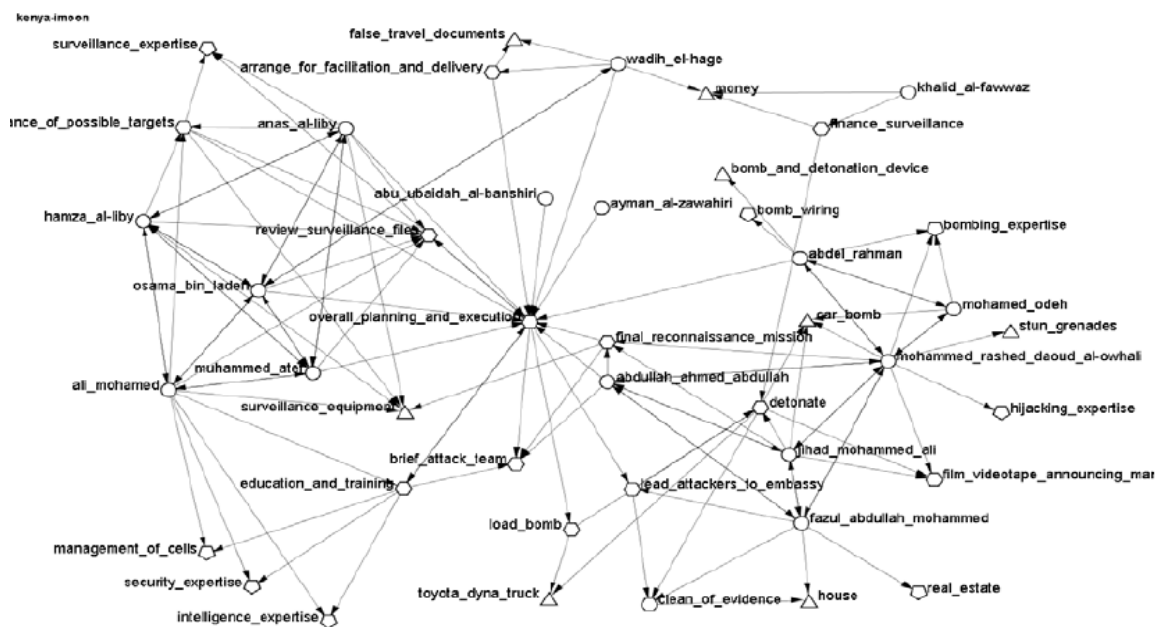


Figure 6.4: Visualization of terrorist activities [22]

7. MARKET TARGET AND PARAMETERS

7.1 Facebook

Two keys goals for successful promotion of a brand with huge success are: (i) earning more fans for professional page, to encourage more users to like the page. (ii) Maintaining the fans for professional page. These goals can be fulfilled by interaction

with fans, which might leads to traffic to the website [23]. We've reviewed that there's 3 parameters of company create different pages for unique reasons:

- Professional Page: It's the most essential entity. Acquiring fans via professional pages is the primary goal. Targeted

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advertisements, posts are used to maximize the reputation. It's an outbound marketing approach to drive users.

- Group Page: this provides critically unique role for campaigning. This provide support to the clients via open communication services like discussions, grievances, feedbacks.
- Personal Page: It's an essential part of promotions that enable clients to get closer view, allows user to follow updates, complete interactions.

7.2 Twitter

Twitter is a famous microblogging real time service, which allows users to share opinions and information commonly known as tweets that have limit up to 140 characters. Tweets are used as basic corpus for sentimental analysis. With millions of users and countless messages, twitter became an asset for organizations to examine their brand reputation as well as the cliental opinions. With steady growth over years, twitter is expanding rapidly into an API that is going public [24].

Twitter is integrated with web applications and other services like SMS (Short Message Service), RSS (Really Simple

Syndication), emails and other platforms. Due to which twitter became an active research area in the field of opinion mining. Due to its robustness, it's rapidly used for updates by news organizations. Several unique features in twitter messages ensures its complexity to analyse and classification are as follows [25]:

- Length: The word limit is up to 140 characters comprised of 1 or 2 sentences.
- Data Availability: Twitter API supports searching tweets for a specific query.
- Confusing Polarity: Disagreement in specific tweets for polarity assignment.
- Usage of Emoticons: Emoticons serves as noisy label. In several cases, emoticons do not make sense to evaluators and normally assessed as negative.
- Casual Language: Twitter supports casual language despite of correct spelling.
- Use of special symbols: Special symbols like # to denote key subject and RT denotes forwarded tweet from old tweet by different user.

Table 5: Analysis of variables by SNS type [26]

		Mean	SD	Max	Min	Kurtosis	Skewness
Privacy concerns of posting types on Facebook (n=216)	Posting own timeline	4.43	2.19	7	1	-1.31	-.38
	Posting on other's timeline	4.26	2.04	7	1	-1.15	-.30
	Others posting on own timeline	4.91	1.94	7	1	-.54	-.75
Privacy concern based on posting	My Tweets	3.30	2.32	7	1	.140	.42
	My Tweets	3.17	2.19	7	1	-1.26	.49
Types on Twitter (n=175)	Others retweet on my tweets	2.95	2.16	7	1	-1.06	.65
Privacy concerns based on audience types on Facebook (n=216)	Marketers	3.54	1.91	7	1	-1.01	.24
	Authoritive Figures	4.13	2.08	7	1	-1.28	-.17
	Distant relations	3.49	1.90	7	1	-1.05	.21
	Overall privacy concern	3.72	1.54	7	1	-.69	.05
Privacy concerns based on audience types on Facebook (n=216)	Marketers	2.55	1.89	7	1	-1.4	1.04
	Authoritive Figures	3.27	2.25	7	1	-1.34	-1.34
	Distant relations	2.61	1.88	7	1	-.24	-.24
	Overall privacy concern	2.81	1.68	7	1	-.56	.62

8. CONCLUSION AND FUTURE SCOPE

In this paper, we have assessed a few interpersonal interaction locales, advancement and foundation and noteworthiness of online networking. Person to person communication is utilized as stage for different applications like: government, business, instructive, political, dating and marital, and so on. Inspiration is to look at antagonistic systems and speaks to the exercises saw by analyser. Moreover we've inspected informal organization model and activities performed in it alongside re-

enactment and close degree calculation, Adversarial Network analyser and examination of vulnerabilities of an association broke down. We analysed the kinds of posting via web-based networking media sites and impact of posting information and security worries of Facebook and twitter clients. This investigation demonstrates the diverse worries of clients in regards to posting data and its persuasions of client based security concerns. What's more we examined a few grouping and bunching procedures utilized for information mining in

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online long range interpersonal communication destinations and the market targets and parameters and investigation of various factors according to the utilization of SNSs.

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