



## Understanding Social Ties in Context of Online Social Networks

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**Abstract:** Information explosion has no doubt brought about revolution in the way we communicate. Communication has become extremely fast, crisp and devoid of human touch. While earlier in the era of face to face communication trust could be experienced through facial expressions or body language. However, now with use of Emails, sms and chats, communication has increasingly become faceless and therefore it is becoming increasingly becoming difficult to evaluate trust in relationships. Present study attempts to evaluate trust in online relationships based upon certain aspects like – intimacy, intensity, social distance and friendship score. In our study we consider trust as a dependent variable and other factors as independent variables and intend to apply polynomial regression to find out the relationship between dependent and independent variables.

**Keywords –** Trust, Regression, Online relationships,

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### I. Introduction

A social group is theoretically defined as two or more people who interact with each other. The mode of interaction may be face to face or through any other mean like letter, phone, or email. While these interactions in the past were more of the nature of face to face of interaction, these interactions in the present era have undergone complete metamorphosis and have become remote either through mobile phone or internet (emails, chat etc.). There is no denying the fact that modern modes have made communication faster and crisp, it has however taken the human aspect out of the communication process. It is becoming increasingly difficult to know the level of honesty and earnestness in the communication as most important aspect of facial expression, tone and tenor (in case communication is through email or chat) is missing. While earlier face to face interaction facilitated these aspects. It is therefore important for us to understand the changed dynamics of communication and develop a model which will help us in gaining an insight into the factors which indicate trust between two individuals in online relationship. The present study attempts to develop a model which may predict the strength in relationship based upon the presence of trust. Since trust is something which is highly subjective, measuring or predicting it will be a highly complex work. For the purpose of this study we are assuming trust as dependent variable being influenced by independent variables like – intimacy, intensity, social distance and friendship score.

### II. Related Work

Studies have been carried out to unravel the mystery of trust in online relationships, Kuter [4] elaborates that in many computing systems, and information is produced and processed by many people. He describes a new approach that gives an explicit probabilistic interpretation for confidence in social networks and describe SUNNY, a new trust inference algorithm that uses a probabilistic sampling technique to estimate confidence in the trust information from some designated sources. To simulate trust in the WBSN environment, J. Golbeck and J. Hendler [Jennifer Golbeck, James Hendler, Nov 2006], propose that there are three main properties of trust. They are transitivity, asymmetry, and personalisation. The Tidal Trust algorithm is proposed by Golbeck [2005] [17]. It considers the trust values to be numbers in a continuous range of [0..10]. It is simple and its low complexity ( $O(V + E)$ ) allows high scalability in its application. Golbeck assumes [2] trust values inferred through shorter paths may be more accurate, thus only the shortest paths from source to sink are considered. This works for the algorithm because it simplified the algorithm; however, its weakness is it excluded information that may be useful from nodes of longer paths, especially the case where majority of the nodes in the longer path may have more trusted nodes. Two algorithms proposed by Jennifer Golbeck [17], James Hendler [Nov 2006] aim to develop efficient and accurate mechanisms for inferring trust relationships that use only the structure and trust ratings within a social network. They integrate them based on binary trust assignment (zero or one) and input the results into an experimental email client application called Trust Mail to enhance email filtering.

Wenjun Jiang [14] proposes the PSN (preprocessing the social network) algorithm based upon Granovetter's famous theory (a highly-influential sociology paper with over 20,000 citations, according to Google Scholar). This theory, known as "The Strength of Weak Ties", discussed the spread of information in social networks. The theory, elaborates that weak ties are dramatically valuable, because they are usually the source of new information. Wang and

Wu [7] proposed Flow Trust to infer trust with network flows and Me Trust for trust management with multi-trusted paths, based on multi-dimensional evidence. In both papers, they presented the strong necessity of generating small trusted graphs. Mármol and Pérez summarized features of trust and reputation models, in which gathering behavioural information, scoring and ranking entities, entity selection, transaction, and rewarding and punishing entities are five components of a complete model. The study does not extend work into developing an integrated trust evaluation model, but rather, focuses on generating trusted graphs capable of being incorporated into the existing models and form first three components of a complete model. Skopik et al. presented a novel approach addressing the need for flexible discovery and the involvement of experts and knowledge workers in distributed and cross organizational collaboration scenarios, in which they focused on the notion of social trust in collaborative networks, and demonstrated the inference of trust depending on captured collaboration data that considers individual trust perceptions. **De Meo et al.** proposed a general approach to recommend similar users, resources, and social networks to a user, which operates in a social internetworking context instead of on a single social network, considering both explicit and implicit relationships and taking into account both local and global information. **Kim et al.** proposed a trust-prediction framework in rating based experience sharing social networks, which can work even without a web of trust. Their work measures a degree of trust based on user's expertise and preferences regarding topics (i.e., categories), based upon user's feedback rating data, which is available and much denser than a web of trust. **Jennifer Golbeck [20]** present an algorithm for inferring trust relationships in social networks, based on The Eigen Trust algorithm using peer-to-peer systems and calculates trust with a variation on the Page Rank algorithm, used by Google for rating the relevance of web pages to a search.

### III. Proposed Methodology

In our proposed model of trust analysis we assume that trust amongst two people connected on twitter follows the following relationship:

$$T = a + bI + cI_t + dS + eF$$

Where

T = Trust,

I = Intensity

Intimacy<sub>t=</sub>

S = Social score

F = Friendship score

Intimacy Variable - Intimacy variable measures the intimacy between two tweeters on the basis of appearance of certain words characterized as intimate words. A dictionary of these intimate words will be generated on the basis of Delphi technique. Intensity Variables - Intensity variable refers to the frequency of communication between the two friends. It represents the number of words exchanged over the period under study. It also includes the number of times a particular person has tweeted with another person (tweet length). A dictionary of intensity words will be generated in the same way as dictionary of intimacy words using Delphi technique. Trust - Trust refers to the faith that tweeters have amongst them. It indicates the extent to which they can confide among themselves and the degree to which they feel comfortable amongst each other. A dictionary of words indicating trust between the tweeters will be generated using Delphi technique as explained above. Friendship Score - Friendship score represents a ratio of incoming friendships to outgoing friendships. Incoming friendship refers to the number of followers a person has and outgoing friendship number of persons a person is following. Social Distance - The term social distance refers to the educational difference between the two friends. A dictionary of words that indicates the educational difference will be prepared in the same way as explained above. A "term frequency score" for each of these emotions will be generated. Term Frequency Score represents number of times a word corresponding to a particular emotion appears in the tweets between two friends. This will be followed by obtaining "In Between Ratio" representing the direction of relationship between two friends. 'In Between Ratio' represents relationship between two persons corresponding to the term frequency score between them. The term frequency score of F1 for F2 is 95, while the term frequency score of F2 for F1 is 45. So, the "intimacy score" of 'F1' for 'F2'" is calculated by the following formula:

$$I_{F1F2} = \frac{I}{\text{Score F1F2} / \text{Score F2F1}}$$

$$= 95/44$$

$$= 2.11$$

Conversely intimacy score of "F2" for "F1" will be:

$$\frac{F2F1}{\text{Score } F2F1 / \text{Score } F1F2}$$

$$= 45/95$$

$$= 0.47$$

The "In Between Ratio" indicates that though F1 considers himself to be intimate to F2, same is not true for F2. Similarly, 'In between ratio' for intensity, trust and social distance can be calculated. The 'in between ratio' for friendship is calculated using the following formula:

$$F = \frac{\text{Number of incoming friends}}{\text{Number of outgoing friends}}$$

Where, number of incoming friends refers to the number of persons that are following the person under study. Whereas, number of outgoing friends refer to number of people the person under study is following. A polynomial and linear regression will be carried out to establish the relationship between trust and other predictive variables.

#### IV. Conclusion

More and more people use OSN to share their interests and make friends, also the OSN helps users overcome the geographical barriers. With the development of OSN, there is an important problem users have to face that is trust evaluation. Before user makes friends with a stranger, the user need to consider the following issues: Can a stranger/acquaintance be trusted? [18] How much the stranger/acquaintance can be trusted? How to measure the trust of a stranger/acquaintance. However, the open nature of the social networks and the sensitive data they collect is attracting the street criminals to wonder around much more safely with anonymous or stolen identities in the online world.

#### V. Future Scope

In accordance to the study conducted, it seems that we can give general guide lines for future:

- 1) Develop a representative dataset of micro-blogging Site users and their profiles with friend and their friend ships using Big Data concepts
- 2) Develop extraction algorithm to develop graphs based on graphs theory so that the tracking of social and anti social elements is done real time online

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