



Queensland University of Technology
Brisbane Australia

This is the author's version of a work that was submitted/accepted for publication in the following source:

[Bhuiyan, Touhid](#) (2010) A survey on the relationship between trust and interest similarity in online social networks. *Journal of Emerging Technologies in Web Intelligence*, 2(4), pp. 291-299.

This file was downloaded from: <http://eprints.qut.edu.au/41436/>

© Copyright 2010 Academy Publisher

Notice: *Changes introduced as a result of publishing processes such as copy-editing and formatting may not be reflected in this document. For a definitive version of this work, please refer to the published source:*

<http://dx.doi.org/10.4304/jetwi.2.4.291-299>

A Survey on the Relationship between Trust and Interest Similarity in Online Social Networks

Touhid Bhuiyan

Faculty of Science and Technology

Queensland University of Technology, Brisbane, Australia

Email: t.bhuiyan@qut.edu.au

Abstract—A remarkable growth in quantity and popularity of online social networks has been observed in recent years. There is a good number of online social networks exists which have over 100 million registered users. Many of these popular social networks offer automated recommendations to their users. This automated recommendations are normally generated using collaborative filtering systems based on the past ratings or opinions of the similar users. Alternatively, trust among the users in the network also can be used to find the neighbors while making recommendations. To obtain the optimum result, there must be a positive correlation exists between trust and interest similarity. Though the positive relations between trust and interest similarity are assumed and adopted by many researchers; no survey work on real life people's opinion to support this hypothesis is found. In this paper, we have reviewed the state-of-the-art research work on trust in online social networks and have presented the result of the survey on the relationship between trust and interest similarity. Our result supports the assumed hypothesis of positive relationship between the trust and interest similarity of the users.

Index Terms—trust, interest, opinion, recommender system, similarity, survey.

I. INTRODUCTION

In recent years, there are many online communities which offer automated recommendations to their users. Typically, the automated recommendations are generated based on the past ratings of the similar users. This survey aims to research user's opinion about the correlation of "similarity" and "trust" for recommendation making in the case of recommendations based upon opinions from trusted peers rather than most similar ones and in particular automated recommendation in online environment. Users of the online social networks may share their experiences and opinions within the networks about an item which may be a product or service. The user faces the problem of evaluating trust in a service provider before making a choice. Recommendations may be received through a chain of friend's network, so the problem for the user is to be able to evaluate various types of trust opinions and recommendations. This opinion or recommendation has a great influence to choose to use or enjoy the item by the other user of the same online community such as a social network.

Collaborative filtering is the most popular online recommender system which relies upon building neighborhoods of like-minded customers [1]. The task in collaborative filtering is to predict the utility of items to a particular user based on a database of user rates from a sample or population of other users. The process usually takes two steps, firstly; it looks for neighbor users who share the same rating patterns with the target user for whom the prediction needs to calculate and then secondly, uses these ratings from those like-minded neighbor users to calculate a prediction for the target user. Because of the different taste of different people, they rate differently according to their subjective taste. If two people rate a set of items similarly, they share similar tastes. However, previous studies have found that collaborative filtering method performs poor in a situation where previous common experience information is not present [2] popularly known as cold start problem. To overcome this cold start problem and with the dramatic growth of online social networks, trust based approach to recommendation has emerged [3, 4, 5]. This approach assumes a trust network among users and makes recommendations based on the ratings of the users that are directly or indirectly trusted by the target user. In such a system; trust is used for neighborhood formation. Trust could be used as supplementary or replacement method of widely used collaborative filtering system.

Trust-based recommender can make recommendations as long as a new user is connected to a large enough component of the trust network. A previous study has also shown that trust-based recommendations outperformed collaborative filtering algorithms in certain cases [6]. The possible reason for that includes collaborative filtering algorithms use overall similarity of user profiles to make recommendations, their results suggested that when users assign trust, they are capturing more than just overall similarity. Services offered and provided through the Web including online social network have varying quality, and it is often difficult to assess the quality of a service before accessing and using it. Trust and reputation systems can be used in order to assist users in predicting and selecting the best quality services. In the following sections; we have described briefly the current status of the online social networks and trust and similarity related issues in online environment. Though the positive relations between trust and interest

similarity is assumed and adopted by many recommender systems researchers which almost makes it as the foundation of trust-based recommender systems, we could not find any survey work on real life people's opinion to support this hypothesis. In this paper we have surveyed and analyzed the online users' opinion about the relationship between trust and interest similarity and the findings are presented which could be useful in the trust-based automated recommender systems research area. The rest of the paper is organized in following ways. In section 2, we have discussed the fundamental of trust by formally defining trust and listing its characteristics. Chapter 3 presented a brief summary of online social network evolution. Chapter 4 described an analysis of the current research work on trust and interest similarity. Chapter 5 explained our survey method in detail and chapter 6 presented the results of the survey. Chapter 7 discussed about the findings and the paper is concluded in chapter 8.

II. TRUST FUNDAMENTALS

A. Defining Trust

Trust has become important topic of research in many fields including sociology, psychology, philosophy, economics, business, law and IT. It is not a new topic to discuss. In fact, it has been the topic of hundreds books and scholarly articles over a long period of time. Trust is a complex word with multiple dimensions. A vast literature on trust has grown in several area of research but it is relatively confusing and sometimes contradictory, because the term is being used with a variety of meaning [7]. Also a lack of coherence exists among researchers in the definition of trust. Though dozens of proposed definitions are available in the literature, a complete formal unambiguous definition of trust is rare. In many occasions, trust is used as a word or concept with no real definition. Hussain et al. [8] present an overview of the definitions of the terms of trust and reputation from the existing literature. They have shown that none of these definitions is fully capable to satisfy all of the context dependence, time dependence and the dynamic nature of trust. The most cited definition of trust is given by Dasgupta where he defines trust as "the expectation of one person about the actions of others that affects the first person's choice, when an action must be taken before the actions of others are known" [9]. This definition captures both the purpose of trust and its nature in a form that can be reasoned about. Another definition for trust by Gambetta [10] is also often quoted in the literature "trust is a particular level of the subjective probability with which an agent assesses that another agent or group of agents will perform a particular action, both before he can monitor such action and in a context in which it affects his own action". But trust can be more complex than these definitions.

Trust is the root of almost any personal or economic interaction. Keser [11]. states "trust as the expectation of other persons goodwill and benign intent, implying that in certain situations those persons will place the interests of

others before their own". Golbeck [6] defines trust as "trust in a person is a commitment to an action based on belief that the future actions of that person will lead to a good outcome". This definition has a great limitation that it considers trust as always leading to positive outcome. But in reality, it may not be always true. Trust is such a concept that crosses disciplines and also domains. The focus of definition differs on the basis of the goal and the scope of the projects.

Two generalized definitions of trust defined by Jøsang [12] which they called reliability trust (the term "evaluation trust" is more widely used by the other researchers, therefore we use this term) and decision trust respectively will be used for this work. Evaluation trust can be interpreted as the reliability of something or somebody. It can be defined as the subjective probability by which an individual, A, expects that another individual, B, performs a given action on which its welfare depends. On the other hand, the decision trust captures broader concept of trust. It can be defined as the extent to which one party is willing to depend on something or somebody in a given situation with a feeling of relative security, even though negative consequences are possible.

B. Characteristics

Dimitrakos [13] surveyed and analyzed the general properties of trust in e-services and listed the general properties of trust (and distrust) as follows:

- Trust is relativised to some business transaction. A may trust B to drive her car but not to baby-sit.
- Trust is a measurable belief. A may trust B more than A trusts C for the same business.
- Trust is directed. A may trust B to be a profitable customer but B may distrust A to be a retailer worth buying from.
- Trust exists in time. The fact that A trusted B in the past does not in itself guarantee that A will trust B in the future. B's performance and other relevant information may lead A to re-evaluate her trust in B.
- Trust evolves in time, even within the same transaction. During a business transaction, the more A realizes she can depend on B for a service X the more A trusts B. On the other hand, A's trust in B may decrease if B proves to be less dependable than A anticipated.
- Trust between collectives does not necessarily distribute to trust between their members. On the assumption that A trusts a group of contractors to deliver (as a group) in a collaborative project, one cannot conclude that A trusts each member of the team to deliver independently.
- Trust is reflexive, yet trust in oneself is measurable. A may trust her lawyer to win a case in court more than she trusts herself to do it. Self-assessment underlies the ability of an agent to delegate or offer a task to another agent in order to improve efficiency or reduce risk.
- Trust is a subjective belief. A may trust B more than C trusts B with the same trust scope.

Wang et al. [14] identifies some characteristics of trust such as context specific, multi-faceted and dynamic. They argue that trust depends on some context. Even in the same context there is a need to develop differentiated trust in different aspects of a service. Trust is also directed and it may not always equal depends on the direction between two agents. As the dynamic character, they refer that trust can increase or decrease with further experiences of interactions or observations. It also decays with time. Golbeck [6] proposes there are three main properties of trust in the web-based social environment. They are (i) transitivity, (ii) asymmetry and (iii) personalization. She explains transitivity as the propagation capability, asymmetry as the direction of trust which may be different depends on the direction and personalization as the personal opinion on a particular object by different agents.

III. ONLINE SOCIAL NETWORKS

Professor J. A. Barnes has introduced the term “Social Network” in 1967 to describe the associations of people drawn together by family, work, hobby etc.; for emotional, instrumental, appraisal and information support [15]. These networks may operate in many levels from family level to a level of nations and can play important roles in communications among people, organizations and even nations; as well as the way how problems are solved and how organizations may run in better way. In its simplest form, a social network is a map of the relevant ties between the individuals, organizations, nations etc. being studied. With the evolution of digital age, Internet provides a greater scope of implementing social networks online. Online social networks have broader and easier coverage of members worldwide to share information and resources.

The first online social networks were called UseNet Newsgroups (www.usenet.com) designed and built by Duke University graduate students Tom Truscott and Jim Ellis in 1979. Since then the online social networks have a continuous growth in size and numbers. In February 2010; online social network giant Facebook cross the massive 370 million registered monthly active user. The table showing a brief timeline of the history of online social networking can be found in Teten and Allen’ work [16].

A January 2009 compete.com study ranked Facebook as the most used social network by worldwide monthly active users, followed by MySpace [17]. Table 1 shows the top 10 most popular online social networks in terms of user’s visit. As on February 2010, Facebook also secured the first position in terms of number of registered users (Table 2).

This is an interesting shift from much of Facebook’s international growth to date. Once Facebook began offering the service in multiple languages (it’s available in more than 70 of them as of today), it started blowing up in many countries like Canada, Iceland, Norway, South Africa, Chile, etc. The United States is at the top with more than 5 million new users; it also continues to be the single largest country on Facebook, with 108

million MAU. That’s 35% of the total US population. Table 3 shows a growth comparison MAU of top 10 countries between January and February 2010.

TABLE I.
TOP 10 MOSTLY VISITED SOCIAL NETWORKS IN JAN’09 BASED ON MAU

Rank	Site	Monthly Visit
1	Facebook.com	1,191,373,339
2	Myspace.com	810,153,536
3	Twitter.com	54,218,731
4	Flixster.com	53,389,974
5	LinkedIn.com	42,744,438
6	Tagged.com	39,630,927
7	Classmates.com	35,219,210
8	Myyearbook.com	33,121,821
9	Livejournal.com	25,221,354
10	Imeem.com	22,993,608

Based on number of registered user and monthly visit; Facebook is the largest and most popular online social network at this moment (www.insidefacebook.com).

TABLE II.
TOP 10 LARGEST SOCIAL NETWORKS IN FEB’10 BASED ON REGISTERED USER

No.	Network Name	Reg User
1	Facebook	350,000,000
2	QZone (Chinese)	200,000,000
3	MySpace	130,000,000
4	Windows Live Spaces	120,000,000
5	Habbo	117,000,000
6	Orkut	100,000,000
7	Friendster	90,000,000
8	Hi5	80,000,000
9	Flixster	63,000,000
10	Netlog	59,000,000

Going down the list, we first see some regulars: Indonesia, Turkey, the U.K. and France. These all have been growing for months. Mexico is on its way to become the largest Spanish-speaking country on Facebook; with a gain of slightly less than a million new users; it is close to the largest, Spain, Argentina and Colombia.

TABLE III.
COUNTRY WISE MONTHLY GROWTH OF FB USER'S AS ON FEB '10

Country	1 Jan 2010	1 Feb 2010	Change	%
U.S.	102,681,240	108,062,900	5,381,660	5%
Indonesia	15,301,280	17,301,760	2,000,480	13%
Turkey	16,961,140	18,556,840	1,595,700	9%
U.K.	23,076,700	24,342,820	1,266,120	5%
France	14,301,020	15,498,220	1,197,200	8%
Mexico	6,671,560	7,624,120	952,560	14%
Germany	5,796,940	6,674,740	877,800	15%
India	5,658,080	6,342,800	684,720	12%
Philippin.	8,806,300	9,317,180	510,880	6%
Brazil	2,373,520	2,869,920	496,400	21%

IV. RELATED WORK OF TRUST AND SIMILARITY

The issue of trust has been gaining an increasing amount of attention in a number of research communities including online recommender system. There are many different views of how to measure and use trust. As trust is a social phenomenon, the model of trust for the artificial world like Web should be based on how trust works between people in society [18]. The rich literature growing around using trust for recommender systems gives a strong indication that this is an important methodology. Unfortunately, the systems being proposed are usually designed from scratch, and only in very few cases are authors building on proposals by other authors. The period we are in can therefore be seen as a period of pioneers. Consolidation around a set of sound and well recognized principles is needed in order to get the most benefit out of trust systems.

Stephen Marsh (1994) is one of the pioneers to introduce a computational model for trust in the computing literature. For his PhD thesis, Marsh investigates the notions of trust in various contexts and develops a formal description of its use with distributed, intelligent agents. But the model is complex, mostly theoretical and difficult to implement. Abdul-Rahman et al. [18] proposed a model for supporting trust in virtual communities, based on direct experiences and reputation. However, there are certain aspects of their model that are ad-hoc which limits the applicability of the model in broader scope. Schillo et al [19] proposed a trust model for scenarios where interaction result is Boolean, either good or bad, between two agents trust relationship. Though, they did not consider the degrees of satisfaction. Two one-on-one trust acquisition mechanisms are proposed by Esfandiari et al. [20] in their trust model. The first is based on observation. They proposed the use of Bayesian networks and to perform the trust acquisition by Bayesian learning. In the model proposed by Yu and

Singh [21], the information stored by an agent about direct interactions is a set of values that reflect the quality of these interactions. Only the most recent experiences with each concrete partner are considered for the calculations. This model failed to combine direct information with witness information. When direct information is available, it is considered the only source to determine the trust of the target agent. Only when the direct information is not available, the model appeals to witness information.

Mui et al. [22] proposed a computational model based on sociological and biological understanding. The model can be used to calculate agent's trust and reputation scores. They also identified some weaknesses of the trust and reputation study which is the lack of differentiation of trust and reputation and the mechanism for inference between them is not explicit. Trust and reputation are taken to be the same across multiple contexts or are treated as uniform across time and the existing computational models for trust and reputation are often not grounded on understood social characteristics of these quantities. They did not examine effects of deception in this model. Pujol [23] proposed a method for calculating the reputation of a given member in a society or in a social network by making use of *PageRank*TM algorithm. Dimitrakos [13] presented and analyzed a service-oriented trust management framework based on the integration of role-based modeling and risk assessment in order to support trust management solutions. They provided evidence of emerging methods, formalisms and conceptual frameworks which, if appropriately integrated, can bridge the gap between systems modeling, trust and risk management in e-commerce.

Selcuk et al. [24] proposed a reputation-based trust management protocol for P2P networks where users rate the reliability of the parties they deal with and share this information with their peers. Sabater et al. [25] have proposed a modular trust and reputation system oriented to complex small/mid-size e-commerce environments which they called *ReGreT*, where social relations among individuals play an important role. O'Donovan et al [3] distinguished between two types of profiles in the context of a given recommendation session or rating prediction. The consumer profile and the producer profile. They described "trust" as the reliability of a partner profile to deliver accurate recommendations in the past. They described two models of trust which they called profile-level trust and item-level trust.

Guha et al [26] proposed a method based on *PageRank*TM algorithm for propagating both trust and distrust. They identified four different methods for propagating the net beliefs values, namely direct propagation, co-citation, transpose and coupling. The *Advogato* maximum flow trust metric has been proposed by Levien [27] in order to discover which users are trusted by members of an online community and which are not. Trust is computed through one centralized community server and considered relative to a seed of users enjoying supreme trust. Local group trust metrics compute sets of agents trusted by those being part of the

trust seed. *Advogato*, only assigns Boolean values indicating presence or absence of trust. It is a global trust algorithm which uses the same trusted nodes to make trust calculation for all users. It makes the algorithm suitable for P2P networks. As the trust inference algorithm has released under a free software license, it became the basis of many research paper. Applesseed trust metric was proposed by Ziegler [28]. *AppelSeed* is closely based on *PageRank*TM algorithm. It allows rankings of agents with respect to trust accorded. One of the major weaknesses is that a person who has made many high trust ratings will have lower value than if only one or two people had been rated. Another weakness of this model is; it requires exponentially higher computation with increasing number of user which makes it non-scalable.

Shmatikov et al. [29] proposed a reputation-based trust management model which allows mutually distrusting agents to develop a basis for interaction in the absence of central authority. The model is proposed in the context of peer-to-peer applications, online games or military situations. Teacy [30] proposed a probabilistic framework for assessing trust based on direct observations of a trustee's behavior and indirect observations made by a third party. They claimed that their proposed mechanism can cope with the possibility of unreliable third party information in some context. Xiong [31] also proposed a decentralized reputation based trust supporting framework called *PeerTrust* for P2P environment. They have focused on models and techniques for resilient reputation management against feedback aggregation, feedback oscillation and loss of feedback privacy. Jøsang et al [32, 33] proposed a model for trust derivation with Subjective Logic. They argued that Subjective logic represents a practical belief calculus which can be used for calculative analysis trust networks. TNASL requires trust relationships to be expressed as beliefs, and trust networks to be expressed as DSPGs in the form of canonical expressions. They have described how trust can be derived with the belief calculus of subjective logic. Xue and Fan [34] proposed a trust model for the Semantic Web which allows agents to decide which among different sources of information to trust and thus act rationally on the semantic web. Tian et al [35] proposed trust model for P2P networks in which the trust value of a given peer was computed using its local trust information and recommendation from other nodes. In a recent work [2] proposes a new algorithm called *TrustWalker* to combine trust-based and item-based recommendation. However, the proposed method is limited to centralized system only. Trust-aware recommender system is gaining attention of many researchers in recent years, where instead of the most similar users opinion, most trusted users opinions are considered to make automated recommendations. The well known reviewers' community Epinions (www.epinions.com) provides information filtering facilities based upon personalized web of trust and it stated that the trust-based filtering approach has been greatly approved and appreciated by Epinions' members

[26]. Ziegler and Golbeck [36] argue that in order to provide meaningful results, trust must reflect user similarity to some extent because recommendations only make sense when obtained from like-minded people exhibiting similar taste. They also proposed a framework which suggests that there is a positive co-relationship exists between trust and interest similarity which means "the more similar two people, the greater the trust between them". The sociology and social psychology researchers address factors in trust in many ways but the existing literature does not directly address how trust relates to similarity. A positive relationship between attitude similarity and friendship has been shown in Burgess and Wallin [37] and Byrne [38]. Golbeck [39] has shown the potential implications for using trust in user interfaces in the area of online social network.

Ziegler and Golbeck [36] proposed a formal framework to show the relationship between trust and overall similarity assuming that given an application domain, people's trusted peers are on average considerably more similar to their sources of trust than arbitrary peers. They proposed that if A denotes the set of all community members, $trust(a_i)$ the set of all users trusted by a_i , and $sim A \times A \rightarrow [-1, +1]$ some similarity function:

$$\sum_{a_i \in A} \frac{\sum_{a_j \in trust(a_i)} sim(a_i, a_j)}{|trust(a_i)|} \gg \sum_{a_i \in A} \frac{\sum_{a_j \in A(a_i)} sim(a_i, a_j)}{|A|-1} \quad (1)$$

By using movie rating data in their experiment, they have shown as the trust between users' increases, the difference in the ratings they assign decreases. It indicates that a positive correlation exists between trust and interest similarity among the users of the networks. Our survey results also support these findings which have discussed in detail in the next sections.

V. MATERIAL AND METHODS

A. Study Objective

The major objective of this survey is to collect information about the major objective of this survey is to collect information about the users view regarding the relationship between trust and interest similarity. We set the questioner to obtain information about three main sub-topics listed below:

- Acceptance of Online Recommendation
- Perceptions about Other Online Users
- Relationship between Trust and Interest Similarity

The list of questions asked to the respondent is included in the *Appendix*.

B. Study Design

An online survey methodology was chosen in order to maximize the geographical spread of respondents, speed of data collection and anonymity of participants [40, 41]. The survey was designed by using *SurveyMonkey.com* and contained 10 different questions. The questions were developed based on key issues in the academic and lay literatures and experiential knowledge. In creating a survey, Coughlan states that the investigator only should

ask what is necessary and not what might be interesting. Trying to answer too many things usually means none of them are answered well [42]. For this reason, the questions were kept in a minimum number. It was stated in the introductory information that the study focuses on the automated recommendation particularly in the online environment. It also stated that ‘you will remain anonymous and any identifiable information you provide will be changed. Information you provide will be held on Survey Monkey’s server, however, Survey Monkey guarantee that the data will be kept private and confidential’.

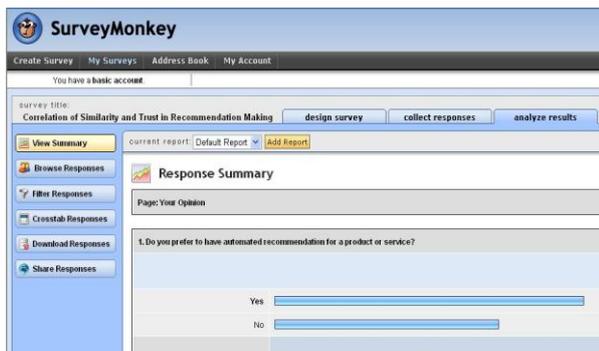


Figure 1. A screen shot of survey tool

The researcher’s contact information was provided for respondents to ask any questions about the study before deciding whether to take part, and information about further sources of support and information were provided. Respondents were free to exit the survey at any point without giving reason and a response was not mandatory for all the questions asked. Australian Psychological Society Ethical Guidelines were adhered to and Queensland University of Technology Human Research Ethics Committee granted ethical approval (Approval number 0900001051 granted on 19/10/2009 in the category of “Human non-HREC”). Czaja and Blair states that an effective survey has three essential characteristics: it is a valid measure of the factors of interest, it convinces the respondents to cooperate, and it elicits acceptably accurate information [43]. All these three characteristics were kept in mind while designing the survey. The survey was piloted and refined before going live.

C. Recruitment and Data Collection

Respondents were recruited using strategic opportunistic sampling. Five recruiting eMails were sent to QUT HDR eMail list, University Alumni Association and personal contacts [44]. The study was also publicized through the social network Facebook in Australia, UK and USA region. Data were collected between November 2009 and February 2010 with majority of responses occurring within first month of the study being publicized. Due to the lack of available time; we had to restrict the survey for 4 months only. The time limitation of this survey also limits the number of respondents. A little longer time could help to increase the number of participants of the survey.

D. Respondents

There were total 408 respondents participated in the study conducted online from the different part of the world including Australia, UK, USA, Bangladesh and China. Though there was no age limit specified for the survey, the invitation email to participate in the survey was sent to the adult online users only who are at least 18 years old. As it was invited to participate online via email, the respondents include both male and female online users of different age groups.

VI. RESULTS

We have received 408 persons in total as the respondent of our online survey through *SurveyMonkey* within the allocated 4 months time period. As the number of questions was limited to only 10, all of the participants answered all questions without skipping a single one. As the objective of the study; we categorized our findings in three different sections which have discussed in the following sub-sections below:

A. Acceptance of Online Recommendation

Among 408 participants, 58% of respondents express their positive opinions about online recommendation. We have asked direct questions like “do you prefer to have automated recommendation for a product or service?” (Fig.2).

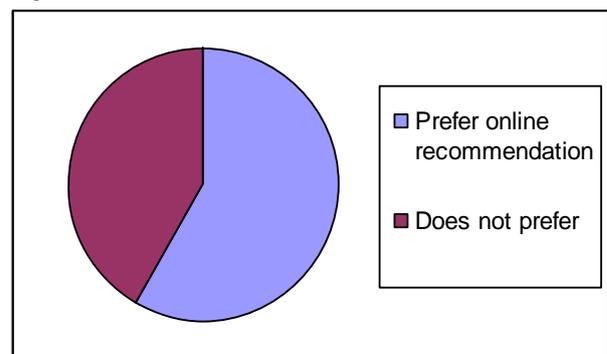


Figure 2. Acceptance of online recommendation

We have also ask indirect questions like “assume that an unknown automobile expert A and one of your friends B who is not an expert about car is available for recommendation while you are going to buy a car; which recommendation will you prefer?”(Fig.3).

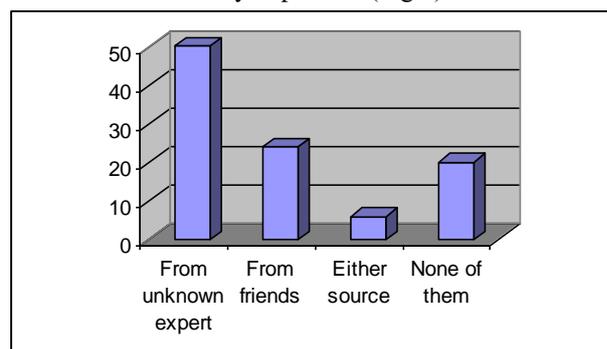


Figure 3. Recommendation source

50% of respondents prefer the expert opinion and 24% prefers the recommendation came from their friends they know personally. 6% of respondents do not have concern about the source of the recommendation, they are happy to receive recommendation from either source. Only 20% do not appreciate any recommendations irrespective of the source of recommender.

B. Perceptions about Other Online Users

A little more than half of the total respondents (52.5%) consider some of them as a friend to whom they met online and others found it difficult to trust them as a friend (Fig.4). About 48% people thinks that it is unnecessary to rate their online friends that how much they trust them.

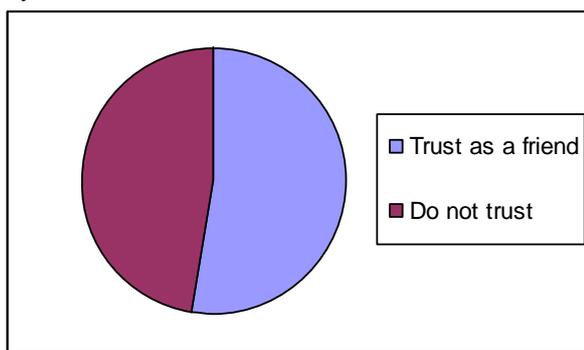


Figure 4. Perception about people they met online

Only 28% people think that it would be helpful mentioning how much they trust their online friend. While other 13% does not bother about it and 11% are undecided. Even they accept online mates as a friend; most of them (59%) do not bother about the rating online friends.

C. Relationship between Trust and Interest Similarity

40% of the respondents express their direct positive opinion about the relationship between trust and interest similarity. There is a large part of (29%) respondents which express their uncertainty about the issue ; could be due to the lack of understanding about the meaning of interest similarity. From the informal feedback of the respondents it has been discovered that many of them were little confused about the interpretation of interest similarity. However, only 31% expressed that they do not find any relationship between trust and interest similarity.

The choices between the recommendation from a similar taste friend and different liking friends; it was pre-assumed that most people will choose the recommendation from a similar taste friend. Our result shows that 66.7% user prefer the recommendation from a similar taste friend rather than different taste friend. Here, the taste should be limited to a particular scope or domain such as movie, book or holiday destination recommendation. It is reflected from the result here that for a given domain, people prefer recommendation from a similar tested friend as a source of recommender. The scope or domain limitation is important for this opinion.

VII. FINDINGS AND DISCUSSION

Several issues have been discovered during the survey. In previous work Sinha and Swearingen [45] presented their findings that people prefer to accept recommendation from their family and friends rather than auto generated recommendation. Our finding indicates that this view has been changed in the last decade. Our result also indicates that most of the people are unsure about other online users to consider as friends and not interested to rate them. However, the overall attitude of the online user about the relationship between trust and interest similarity is positive which was the main objective of our survey. The findings are discussed below.

A. People start relying on the online recommendations.

Unlike the findings of Sinha and Swearingen [45]; who claim people prefer receiving recommendations from people they know and trust, like from their family members or friends rather than from recommender systems; our result shows that people prefer to rely on expert opinion irrespective of known or trusted as long as it comes from an expert.

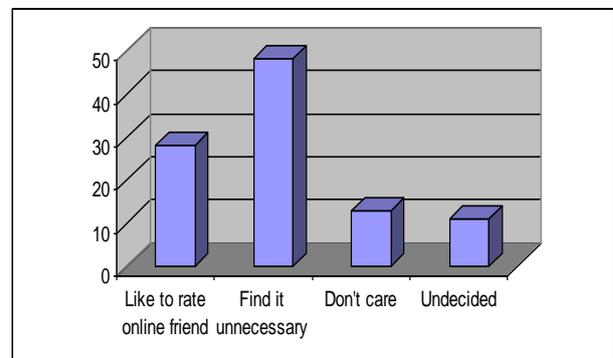


Figure 5. Overall view about other online users

B. People are unsure to consider other online user as friend.

Many people consider the other users they met online as a friend but almost same number of people thinks the opposite. It is found that they are uncertain about treating the persons they met online as their friends.

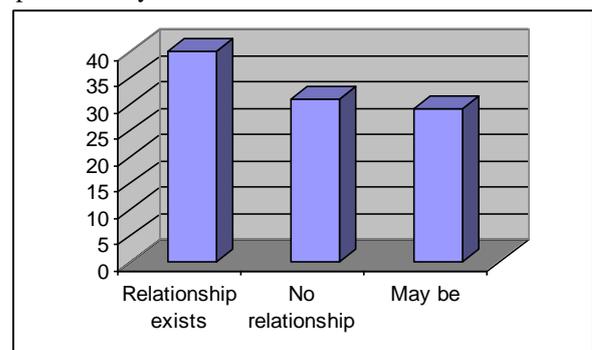


Figure 6. Relationship between trust & interest similarity

C. *There is a positive relationship exists between trust and interest similarity.*

Most of the people think that there is a positive relationship exists between trust and interest similarity among different users. They prefer to trust more to those opinions which taste is similar to them in a particular matter.

VIII. CONCLUSIONS

The positive correlation between trust and interest similarity has been assumed for a long time in the area of recommender systems. Our survey result supports that hypothesis strongly. It is also found that in general, people prefer online recommendation if it comes from a subject expert. But people are uncertain about their accepting the persons they met online as their friends. We believe that our findings of this survey will have a great impact in the area of recommender system research; especially where discovering user interest similarity plays an important role. Though significant effort has been given to collect information about the survey, a broader range of respondents could make the survey results more appreciable in general.

REFERENCES

- [1] Sarwar, B., Karypis, G., Konstan, J. and Reidl, J. (2000). Application of Dimensionality Reduction in Recommender Systems. ACM Workshop on Web Mining for E-Commerce Challenges and Opportunities (WebKDD), August 2000, Boston, USA.
- [2] Jamali, M. and Ester M. (2009). TrustWalker: A Random Walk Model for Combining Trust-based and Item-based Recommendation. KDD'09, Paris, France.
- [3] O'Donovan, J. and Smyth, B. (2005). Trust in Recommender Systems. Proceedings of the 10th International Conference on Intelligent User Interfaces. pp.167-174.
- [4] Massa, P. and Avesani, P. (2007). Trust-aware Recommender Systems. Proceedings of the 2007 ACM Conference on Recommender Systems. Minneapolis, USA, pp.17-24.
- [5] Andersen, R., Borgs, C., Chayes, J., Feige, U., Flaxman, A., Kalai, A., Mirrokni, V. and Tennenholtz, M. (2008). Trust-based Recommendation Systems: An Axiomatic Approach. Proceeding of the 17th International Conference on World Wide Web. Beijing, China. pp.199-208.
- [6] Golbeck, J. (2006). Combining Provenance with Trust in Social Networks for Semantic Web Content Filtering. IPAW 2006: 101-108.
- [7] McKnight, D. H., & Chervany, N. L. (2002). What Trust Means in e-Commerce Customer Relationships: An interdisciplinary conceptual typology. International Journal of Electronic Commerce, 6(2), 35-59.
- [8] Hussain, F. K., & Chang, E. (2007). An Overview of the Interpretations of Trust and Reputation. The Third Advanced International Conference on Telecommunications, Mauritius.
- [9] Dasgupta, P. (1990). Trust as a Commodity. In D. Gambetta (Ed.), Trust: Making and Breaking Cooperative Relations. Oxford: Basil Blackwell.
- [10] Gambetta, D. (Ed.). (2000). Can We Trust Trust? (Vol. 13). Oxford: University of Oxford.
- [11] Keser, C. (2003). Experimental games for the design of reputation management systems. IBM Systems Journal, 42(3), 498-506.
- [12] Jøsang, A. (2007). Probabilistic Logic Under Uncertainty. In The Proceedings of Computing: The Australian Theory Symposium (CATS2007), CRPIT Volume 65, Ballarat, Australia.
- [13] Dimitrakos, T. (2003). A Service-Oriented Trust Management Framework. International Workshop on Deception, Fraud & Trust in Agent Societies, pp. 53-72.
- [14] Wang, L., Y. J. Guo, et al. (2009). A reputation-based trust evaluation model for P2P E-Commerce. International Journal of Distributed Sensor Networks. 5(1): 39-49.
- [15] Barnes, J. A. (1967). Politics in a Changing Society: A political history of the fort Jameson Ngoni. Manchester University Press, UK.
- [16] Teten D., and Allen S. (2005). The Virtual Handshake: Opening Doors and Closing Deals Online. AMACOM/American Management Association.
- [17] Kazeniac, A. (2009). Social Networks: Facebook Takes Over Top Spot, Twitter Climbs. Compete.com. <http://blog.compete.com/2009/02/09/facebook-myspace-twitter-social-network/>. Retrieved 10-02-2010.
- [18] Abdul-Rahman and Hailes, S. (2000). Supporting Trust in Virtual Communities. Proceedings of the Hawaii International Conference on System Sciences, USA.
- [19] Schillo, M., Funk, P. & Rovatsos, M. (2000). Using Trust for Detecting Deceitful Agents in Artificial Societies. Applied Artificial Intelligence.
- [20] Esfandiari, B. and Chandrasekharan, S. (2001). On How Agents Make Friends: Mechanisms for Trust Acquisition. The Proceedings of the Fifth International Conference on Autonomous Agents Workshop on Deception, Fraud and Trust in Agent Societies.
- [21] Yu, B., & Singh, M. P. (2002). Distributed Reputation Management for Electronic Commerce. Computational Intelligence, 18(4), 535-549.
- [22] Mui, L., Mohtashemi, M. and Halberstadt, A. (2002). A Computational Model of Trust and Reputation. In Proceedings of the 35th Hawaii International Conference on System Science.
- [23] Pujol, J. M., Sanguesa, R., Delgado, J. (2002). Extracting reputation in multi-agent system by means of social network topology. The Proceedings of the first international joint conference on autonomous agents and multi-agent systems, Italy, pp. 467-474.
- [24] Selcuk, A., Uzun, E. and Pariente, M. R. (2004). A Reputation-based Trust Management System for P2P Networks. IEEE Int. Symposium on Cluster Computing and the Grid.
- [25] Sabater, J. and Sierra, C. (2005). Review on Computational Trust and Reputation Models. Artificial Intelligence Review, 2005 Vol.24, pp. 33-60.
- [26] Guha, R. V., Kumar, R., Raghavan, P., Tomkins, A., (2004). Propagation of trust and distrust. The Proceedings of the 13th International World Wide Web Conference, USA, pp. 403-412.
- [27] Levien, R. (2004). Attack-resistant Trust Metrics. Ph.D. thesis, University of California at Berkeley, USA.
- [28] Ziegler, C.N. (2005). Towards Decentralized Recommender Systems. PhD Thesis, University of Freiburg, Germany.
- [29] Shmatikov, V., & Talcott, C. (2005). Reputation-based Trust Management. Journal of Computer Security 13(1), 167-190.

- [30] Teacy, W. T. L. (2005). An Investigation into Trust & Reputation for Agent-Based Virtual Organisations. ECS, University of Southampton, UK.
- [31] Xiong, L. (2005). Resilient Reputation and Trust Management: Models and Techniques. PhD thesis, Georgia Institute of Technology, USA.
- [32] Jøsang, A. Hayward, R. and Pope, S. (2006). Trust Network Analysis with Subjective Logic. In Proceedings of the 29th Australasian Computer Science Conference (ACSC2006), CRPIT Volume 48, Hobart, Australia.
- [33] Jøsang, A. and Bhuiyan, T. (2008). Optimal Trust Network Analysis with Subjective Logic, The Second International Conference on Emerging Security Information, Systems and Technologies. Cap Esterel, France.
- [34] Xue, W. and Fan, Z. (2008). A New Trust Model based on Social Characteristic and Reputation Mechanism for the Semantic Web. Proceedings of the Workshop on Knowledge Discovery and Data Mining.
- [35] Tian, C.-Q., Zou, S.-H., Wang, W.-D. and Cheng, S.-D. (2008). Trust Model based on Reputation for Peer-to-peer Networks. Journal on Communication, 29(4), 63-70.
- [36] Ziegler, C. N. and Golbeck, J. (2007), Investigating Interactions of Trust and Interest Similarity. Decision Support Systems. Vol. 43, pp.460-475.
- [37] Burgess, E. and Wallin, P. (1943). Homogamy in Social Charactics. American Journal of Sociology. Vol. 49, No. 2, pp.117-124.
- [38] Byrne, D. (1961). Interpersonal Attraction and Attitude Similarity. Journal of Abnormal and Social Psychology. Vol. 62, No. 3, pp.713-715.
- [39] Golbeck, J. (2009). Trust and Nuance Profile Similarity in Online Social Network. ACM Transactions on the Web. Vol. 3, N0. 4, pp.12.1-33.
- [40] Harding, R. and Peel, E. (2007). Surveying Sexualities: Internet Research with non-heterosexuals. Fem Psychol 2007, Vol 17, pp.277-285.
- [41] Peel, E. (2009). Online Survey Research about Lesbian and Bisexual Women's Experiences of Pregnancy Loss: Positive and Pitfalls. British Psychological Society Division of Health Psychology Conference, 9-11 Sept, 2009. Aston University, Birmingham, UK.
- [42] Coughlan, M., Cronin, P. and Ryan, F. (2009). Survey Research: Process and Limitations. International Journal of Therapy and Rehabilitation Vol. 16, No. 1, pp.9-15.
- [43] Czaja, R. and Blair, J. (2005). Designing Surveys: A Guide to Decisions and Procedures. Thousand Oaks, CA: Pine Forge Press.
- [44] Innovation Network. Data Collection Tips: Developing a Survey. Retrieved on 1 November 2009, from www.innonet.org/client_docs/File/Survey_Dev_Tips.pdf
- [45] Sinha, R. and Sweringen, K. (2001). Comparing Recommendations made by Online Systems and Friends. Proceedings of the DELOS-NSF Workshop on Personalization and Recommender Systems in Digital Libraries. June 2001, Dublin, Ireland.
2. Assume that an unknown automobile expert A and one of your friends B who is not expert about car is available for recommendation while you are going to buy a car. Which recommendation will you prefer?
 - A
 - B
 - Either one
 - None of them
 3. Which recommendation will you prefer most?
 - From a friend whom you trust
 - From a person who has similar taste like you
 4. Do you consider people you have met in online as your friend?
 - Yes, some of them
 - No, it is difficult to trust them
 5. Would you like to rate how much you trust your friends?
 - Yes, that would be helpful
 - No, that is not necessary
 - Don't care
 - Undecided
 6. If you could rate your online friends, would you be bothered doing so?
 - Yes, I would
 - No, I wouldn't
 - Don't care
 7. Which one is more important to you? A recommendation from a person who
 - Has a good reputation
 - Is competent in the area of recommendation
 - Is believed by you
 - deserves confidence
 8. In terms of recommendation making, which one best describe your opinion?
 - Automated recommendation generated by expert system
 - Only from people I know
 - Only from my family and friends
 9. One of your friends X has similar taste like you while selecting movies and other friend Y has interest on different types of movies.
 - I will trust X more than Y to make movie recommendation for me
 - Either one is equal to me as long as I know them
 - None of them
 10. Do you think there is any relationship between "Trust" and "Interest Similarity"?
 - Yes
 - No
 - May be

APPENDIX

The following Questioner is used to collect data for the survey.

Please select the option that best describes your opinion.

1. Do you prefer to have automated recommendation for a product or service?
 - Yes
 - No