Social Media Question Asking (SMQA): Whom Do We Tag and Why?

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ABSTRACT

Social media question asking (SMQA) is an interesting application where users ask factual or subjective questions through social networks, also make invitations or seek favours, among other types of queries. Topics like what we ask, what motivates us to answer, how to integrate the traditional search engines with SMQA, etc. have been well investigated. However, the effect on tagging particular people in queries is yet to be explored. In this work, we focus on targeted queries in social networking sites, where people tag some of their friends, but also remains open to others who might want to respond. We conducted a two-phase study to investigate users tagging behaviour based on question topic and type, their rationale behind tagging those particular people, and corresponding outcomes of tagging. Our result contradicts with the existing works that tried to use automated tagging in social networks and identify design opportunities that need to be considered while developing new solutions to assist in this regard.

CCS CONCEPTS

• CCS → Human-centered computing → Human computer interaction (HCI) → Empirical studies in HCI

KEYWORDS

Social Media, Question Asking, Friends, Tie Strength.

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1 INTRODUCTION

The last decade has seen the emergence of social networking sites (SNS), connecting billions of people around the globe. Therefore, it took researchers little or no time to understand its potential in information searching and retrieval. Social media question asking (SMQA) is of interest for quite some time now and a whole CSCW workshop was dedicated to address the related concerns [1]. What types of questions we ask through social networks [18], why do we use it for the purpose [18] (and why we do not [19]), when do we use it [8], who answers and why [5, 9], social-bonding associated with SMQA [20], how to take advantage of search engines (SE) with this kind of social search [10], and many more issues have intrigued the researchers over this period.

The history of research on social search precedes the age of social networks by many years [2, 7]. Social search is indeed a computer-mediated human-to-human communication where one user asks a question to other users. Even before the computer era, human beings are assisting other fellow humans with information, knowledge, and wisdom conveyed through face-to-face meetings, word of mouth, or books for millenniums. The digital revolution in the past six decades has enabled us to accumulate and store information in a never-seen-before scale. Moreover, the ability to algorithmically and efficiently search through this vast amount of data has made the search engines being used by virtually every computer user.

From the 1960s, as the Internet started to connect the vast population around the world, user groups and forums became ubiquitous too, ranging from general purpose to secret communities. People can post their queries and get answers from people all over the world using these crowd-sourced forums. These groups are still very useful, but as the Internet paved the way for social networking sites, a new era of social search appeared. Question asking through these social networks are often termed as "friend-sourced" compared to the existing crowd-sourced social search methods [18]. In this sense, SMQA is very different from asking specific persons through personal or group

messaging in social networks. SMQA is also significantly different than asking queries in a crowd-sourced platform (e.g., Yahoo Answers or Quora), because of its friend-sourced nature. In case of SMQA, many of the askers' friends will see and then answer that query, which enables them to better understand the context of the question and make the reply more customized [18].

In this work, we use Facebook as an example SNS, without losing much generalizability. People often use their posts on Facebook to ask questions that can have different visibility levels (e.g., friends only, friends of friends, public, etc.). Through SMQA, thus users make queries that their *friends* can see and reply (also others, based on privacy settings). However, there is a problem associated with this - most of the social networks including Facebook does not reveal the information about who has seen or read users' posts [6]. The reason behind this might relate to the privacy concerns of the users. In addition, they usually do not forward these posts to everyone in users' network; they use custom algorithms to determine the audience of users status messages [21]. Hence, their lies a significant research interest to determine how the queries can be forwarded to the appropriate persons that can and are willing to reply to those queries.

It has two potential solutions. First, the social networking sites can try to determine the target audience of that query, which they possibly do for all posts, with or without considering the SMQA nature of that post. Nevertheless, this approach has limitations as the user may not have any control or knowledge about the result of these algorithms. Second, social networking sites can enable the users to tag specific friends along with their query, ensuring that those friends will be notified about that post. Thus, the users can find a way around to reach those specific friends and still keeps it open to everyone else to contribute by answering their query. This is very different than asking multiple friends through personal messages, as it also allows everyone else to see and reply to that post.

In this work, we particularly focus on this second approach. This phenomenon has been identified and discussed by some previous works that we present next. Researchers have tried to analyze the expertise of the friends or associates in the users' social networks to identify appropriate people that can answer their query and forwarded the query to them [24] or tagged those people [10]. However, all these studies showed the limitation of this approach and recognize that there is a lack in our understanding from the users' perspective about (1) whom do they tag, (2) why do they tag these people, and (3) the outcome of this tagging in their SMQA experience. In this work, we address this gap.

In the next section, we present the previous works that discussed SMQA, especially focusing on tagged questioning afterwards. Then we discuss the first phase of our study that consisted of data collection from real-world settings. We analyze those data to identify common themes and use our second phase of the study to probe deeper into those findings. The second phase consisted of a controlled study involving study participants posting different queries, analyzing those queries, and interview of their experience about the process. Finally, we discuss design implications of our findings for SMQA. The findings from this paper will contribute to model user behavior well and design for better user experience.

2 RELATED WORKS

In this section, we begin with a brief overview of scholarly works related to SMQA. We then focus on the recipients of users' queries and different factors influencing response rate. Finally, we present related works that specifically works with tagging in SMQA.

2.1 Overview of Social Media Question Asking

Lampe et al. [13] analyzed how the use of Facebook has changed over time using three consecutive years of survey data and through interviews. Their study, consistent with others, found that the number of friends and time spent on Facebook increased at first and then leveled off. The interview data suggested that new users spend time adding people as friends and getting used to the site. After a while, this behavior lessens as time is spent more seeing what is happening to friends instead of expanding their friend-base. In another study, Lampe et al. [14] investigated the Facebook user characteristics based on a survey of 614 people who used it to ask a question. They identified the perception of the relationships within network members as significant predictors of information seeking approach. However, they did not compare between SNS and SE regarding information searching.

Morris et al. [17] addressed this gap, where they explored the pros and cons of using SNS as an information source and compared user interaction when they search anything either on SNS or SE. They find that 53% of the users received quick responses from SNS and 83% received responses eventually as well. One important study in SNS based information search is done by Efron et al. [4], who identified that micro-blogging services are gradually becoming a popular venue for informal information search and concluded that that the act of asking questions in Twitter is not analogous to information seeking in more traditional information retrieval environments. They showed that question asking in micro-blogs is strongly tied to people's naturalistic interactions, which helped them to offer a taxonomy of questions in micro-blogs. We will emphasize this difference in the discussions and its implications on design.

Teevan et al. [23] discussed the types of information people used Twitter to find, for example, breaking news, real-time content, popular trends, etc. They presented a systematic overview of search behavior on Twitter and differences with web search and found that Twitter results included more social content and events, while web results contained more facts and navigation. Based on their study, they recommended that search engines could use trending Twitter queries to discover additional responses that have strong temporal components.

The types and topics of questions in SNS are investigated by Morris et al. [18] using a study of 624 people about their Facebook usage experience. We will use the classifications proposed by Morris et al. [18] in this paper and see how these types/topics affect users' tagging decisions in SMQA. One relevant finding was the motivations for asking questions in SNS - the most important reason reported by their participants was the belief that people in their social network know their context better, therefore, may provide more relevant answers. We sought to investigate if the users also know whom to ask specifically among their friend in their social networks (through tagging).

To evaluate the answer quality of SMQA, Jeong et al. [12] compared the *friend-sourced* answers obtained from SNS with traditional *crowd-sourced* answers. They concluded that friend-sourced SNS systems are at least as good as paid crowd-sourced systems for providing answers to its users' queries. Ahmed et al. [3] emphasized that through SMQA, people can even find answers to queries that they cannot obtain through search engines, due to the unavailability of such information, thus making it particularly important for developing and underdeveloped regions. All these works establish the widespread use of SMQA and its significance. So now, we focus on the audience of these queries and users' awareness around it.

2.2 Target Viewers of SMQA

There have been some interesting works that focused on the audience of the queries in the social networking sites. To explore users' awareness and perception of the Facebook news feed curation algorithm, Eslami et al. [6] interviewed 40 Facebook users and asked them whether a publicly shared post by one of their friends would appear in their own news feed. Surprisingly, they discovered that more than half (62.5%) of their interviewees were not aware that the Facebook news feed does not show all posts. They believed every single story from their followed pages and friends appeared in their Facebook news feed. Thus, they found many people have a different awareness and expectation for the algorithm that is responsible for their Facebook feed than the reality.

To probe deeper in this direction, Rader and Gray [21] created a small scale social network using agent-based modeling that matched its parameters with the real Facebook, as networks that exhibit the same statistical properties often behave similarly system-wide, regardless of the community size. They sought to understand the system level consequences of using filtering algorithms to order and limit information for Facebook newsfeed. They identified that those who are less connected with their friend network are categorized for excessive filtering, whereas those individuals who are strongly connected with their friend network had less content to be filtered. In addition, they reported that the number of posts made by few users may drastically increase after algorithmic curation. Their results indicate that the algorithmic curation process and what a user believes about this algorithm may have a significant impact on not only what content the user sees in his/her feed, but the content that is seen by other users on a global scale.

Both these studies emphasize that the users lack awareness that their queries are not visible to all of their friends, especially to those whom they have not regularly communicated with through that social network. We argue that for algorithmic curation, some friends who would want to answer a query or have expertise in that domain do not even get a chance to see the question. Tagging them appropriately in those queries then becomes more important, as then they will be specifically notified about the query.

There have been many works that discussed who answers the queries and why [9, 20] and different factors influencing it. A controlled study by Teevan et al. [22] analyzed the effect of different factors, e.g., punctuation in status messages, scoping of audience, precision on the response time, quantity, and quality of response. They found that a higher portion of questions with a "?" mark received responses (88.1% vs. 76.3%) and longer queries received fewer and slower responses. They also noted that explicitly scoped questions resulted in better response. Liu et al. [16] analyzed the extrinsic factors that may influence the response rate in social question-answering process, including network size, the frequency of posting, the number of tagged-friends, verified or unverified account, hashtag, emoticon, expression of gratitude, repeated punctuation and interjections, as well as the topic and the posting time of a question. They found significant co-relation with some of these factors.

In another study, Liu et al. [15] attempted to distinguish between queries of subjective vs. objective nature in SMQA. They found that subjective queries take longer time in getting their initial responses. On the other hand, objective queries either get their replies quickly, or does not get any answer at all. Interestingly, in assessing the preferences of friends and strangers on answering subjective or objective questions, they found that even though individuals prefer to ask subjective questions to their friends for tailored responses, however, it turned out

that in reality, strangers were responding subjective questions more. We take this into consideration to investigate how different types/topics of questions are tagged in SMQA.

Panovich et al. [20] evaluated the role of tie strength in question-response behavior as an indication of how close the relationship is – close friends are strong ties, while acquaintances are weak ties. In their study, they asked 19 participants to ask some technological recommendation questions through status messages. After the participants rated the received answers' quality, they compared that with a tie strength metric and found that stronger tie provides better answers than weaker ties, in general. In addition, they found that friends who have expertise in the question topic provide more trustworthy answer irrespective of strong or weak ties.

In this research, we specifically focus on the impact of tagging, and take different factors into account - the types and topics of questions, tie-strength, temporal factors, etc. and its impacts, e.g., response rate, response time, social acceptance, etc. Before going into the depth of our study, we now visit some existing works that studied the impact of tagging in social queries.

2.3 Tagging in Social Media Question Asking

Given the significance of social networking sites for SMQA, there have been some efforts investigating how to forward the users' query to the answerers – depending both on their expertise and the relationship with the asker. Horowitz et al. [11] presented *Aardvark*, a social search engine that forwards user's queries to someone expert within the asker's network, depending on the intimacy between them. Hecht et al. [10] took an initiative of integrating traditional search engines with social media to provide algorithmically generated replies to user queries made through Facebook. Their project *SearchBuddies* had two components – *Investigator* and *Social Butterfly*. Investigator used a whitelist of 31 web domains, empirically developed using the data set of status message questions from [18]. In their deployment, SearchBuddies identified 262 questions, based on the presence of "?" symbol in the status message, of which 72 was later determined to be false positives (rhetorical comment than a question). Investigator sent all these queries to a traditional search engine API and if any of the top three results comes from the whitelisted domains, it posted a short link as a comment to the original query. They tried to minimize unreliable and irrelevant posts forwarded by the Investigator through human intervention in whitelisting the web domains, making only 58 replies (22%) to those 262 queries. Still many of them could not address the question the asker wanted, while some provided totally irrelevant answer to provoke humor or anger among the audience.

Social Butterfly part of SearchBuddies tried to identify other persons from the asker's social network who might have some knowledge about the query. They used people's interest and places from their Facebook profile to filter which of the asker's friends may provide useful pointers to the query and tagged them in that question. Feedback from the users provided some insight about the lack of social ties in considering the list, failure to understand the context of the question, and of course, some success of the initiative. This study provided an important direction for automation in SMQA - we need a high relevance threshold to provide automated reply and avoid false positives by all means. As their study has shown, users expect to see some answers (even if irrelevant) while using search engines and they rephrase the query if they cannot find relevant results. In contrast, algorithmically generated irrelevant answers provoked outrage for SMQA users and they replied harshly or blocked the system from further interaction.

White et al. [24] tried to keep a balance between time latency and interruption costs in their synchronous social Q&A system *IM-an-Expert* to seek professional assistance from within the community. Their project had two parts: recognizing the expertise and an instant messenger (IM) interface to communicate with the expert. Identifying expertise involved creating an explicit self-reported knowledge profile, where users provided keywords and personal website links to describe their expertise. They also analyzed the mailing lists of their 30000 employees, accruing over 0.3 million emails to crawl and index. When a user posted a query, it was analyzed based on keywords to identify top 5 "experts" based on their existing profiles. The query was forwarded to either top two or all five of them (2 control groups to compare) and when the receiver agrees to answer the query, the negotiation process ends. Otherwise, the system will forward the query to another 2 or 5 people from its expert list until someone agrees to answer the query. In this study, users avoided asking subjective or rhetorical questions. Still, it lacked in identifying contexts of questions and in finding an expert appropriately. A significant portion of the users (45% and 55% in two control groups mentioned above) reported that 90% of the queries forwarded to them were not relevant to their expertise.

All these works show us the limitation in exploring expertise as the criteria of choosing the right person to automatically forward the queries to. Hence there is a need to understand the user's perspective about how they choose the person to ask queries, their understanding about the success criteria, and their expectations in this regard. We aim to address these gaps in this study.

Table 1: Analysis of tagging for different question types.

Question Type	No. of Queries	No. of Tagged Queries	% of Tagging
Recommendation	69	4	5.8
Opinion	198	10	5.0
Factual	249	19	7.6
Rhetorical	120	1	0.8
Invitation	29	19	65.5
Favor	178	42	23.6
Social Connection	129	39	30.2
Offer	19	0	0

Table 2: Analysis of tagging for different question topics.

Question Topic	No. of Queries	No. of Tagged Queries	% of Tagging
Technology	238	31	13
Entertainment	235	10	4.3
Home & Family	127	16	12.6
Professional	107	14	13.1
Places	50	19	38
Restaurants	11	5	45.5
Current events	105	21	20
Shopping	19	9	47.4
Ethics & Philosophy	60	6	10
Miscellaneous	39	1	2.56

3 DATA COLLECTION ON TAGGING BEHAVIOUR IN FACEBOOK

We conducted a two-phase study to investigate the research gap discussed above. In the first phase, we posted a request for response through our informal university mailing list and Facebook group, through which we could reach about 20000 alumni and current students. We requested for a sample of any question they posted on Facebook over the past one-month period along with the responses received. We posted this request once for four successive weeks. In total, we could obtain 991 samples from that many unique users.

We aimed to collect real-life data in the wild, and this method allowed us to do so as we did not have access to data from Facebook. While our data collection method is similar with existing research in this domain, (e.g., [18, 24]), we acknowledge the limitation and the lack of generalizability for being the sample not representing the overall Facebook users. However, this research gives some

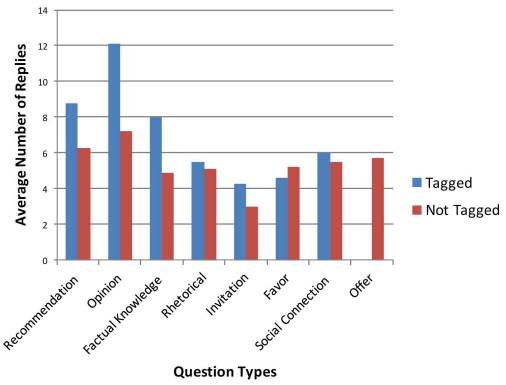

Figure 1: Average number of replies for tagged and untagged questions for different question types.

indication, emphasize our logic, and provide future directions for work. The ethical concerns related to collecting data from Facebook was carefully scrutinized. Hence, we asked the responders to provide us with the samples after removing any identifying information to mitigate privacy concerns. We received 991 responses and analyzed those questions according to the categories mentioned by Morris et al. [18].

We analyzed each of our 991 responses and summarized it into a table, which was then imported to a relational database management system (DBMS). We will present these data along with their implications in this section. Two researchers independently categorized the data and a third member of the research team put input when there is a mismatch. Tagging behavior in our data is depicted in Table 1 and Table 2, which shows the breakdown of tagging behavior by people based on types and topics of questions [18]. It can be noted that in a few cases, the asker did not tag anyone, but someone else has tagged a few people in their comments. It has happened in less than 1% of the cases.

3.1 Preliminary Analysis of Tagging Behavior

From Table 1, we can see that invitation, social connection, and favor are the types of questions where people tagged other persons from their network most often. Offers and rhetorical questions are least tagged, while questions related to factual knowledge and opinion are tagged sporadically. Only 13.5% of all the questions among our samples are tagged and on an average 1.9 persons were tagged in those questions. Many of those tagged questions are posted as public status messages (31%) rather than "friends only" settings, thus indicating that the question setter is happy to have response from anyone.

Table 2 gives us insight about tagging behavior in relation to question topics. Questions related to shopping,

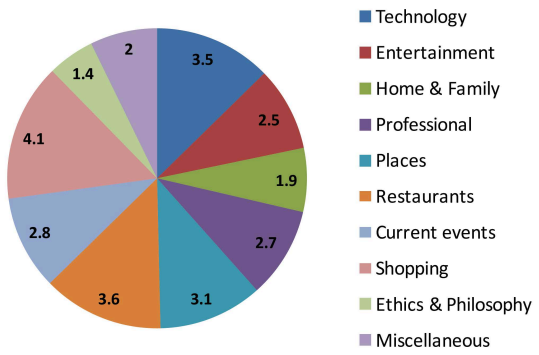

Figure 2: Average number of tags for different question topics.

restaurants, places, and current events are tagged most, while ethics & philosophy and entertainments are tagged least. We did not see any significant variation among males and females in tagging behavior, with females tagging others slightly more than males (6.5% vs 6% of total questions). Figure 2 shows the average number of tags based on topics of questions.

Now we tried to measure the success of tagging in SMQA. From our obtained data, we can see tagged queries is somewhat more successful that untagged ones (Figure 1). Here, 87% of those untagged questions got at least one reply, whereas, with tagging, 98% questions got at least one reply. On an average, tagged questions got more reply than untagged ones (6.3 vs. 4.9). One interesting observation is that many of the untagged persons replied in the tagged questions too. The rate of reply obtained from tagged persons is very high, in about 93% cases, at least one tagged person replied with an answer and in 52% cases, all the tagged person provided some reply. However, it was beyond the scope of this research to measure the quality of the responses or verify the replies.

Tagging people also helped to get response quicker. On an average, untagged questions got their first reply within 16 minutes, whereas, for tagged questions, it is about 11 minutes. Though we did not measure time to get a sufficient reply, as many queries are subjective and may not have a conclusive reply, we can safely infer that tagging can enable users to get attention quicker from their social network members. We also tried to find if tagging some people discourages others to reply, as they might think the question was not intended for them. However, this was not the case. The average number of replies by other people are almost same for both tagged and untagged questions (3.05 vs. 3.2).

3.2 Testing Hypothesis about Tagging Behavior

We used two-tailed t-test to verify the following null hypothesis (NH): *"There is no difference between the average number of replies for tagged and untagged questions"*. Here $df = 989$, for $p < 0.05$, $t = 5.33$ which is bigger than the standard value of 1.96. Therefore, the null hypothesis does not hold and our data shows that there is a statistically significant difference between the average numbers of replies for tagged and untagged questions.

To see if the number of replies depends on the question types, we can use ANOVA test on each of the three dependent variables - number of replies in tagged questions, number of replies for untagged questions, and number of tagged persons in each tagged question to test the following NHs: Number of replies when tagged (NH2) or not tagged (NH3) does not depend on question type, Number of persons tagged in each question does not depend on question type (NH4).

For testing NH2, $df\,(among) = 7$, $df\,(within) = 126$, $F = 4.6$ which is above the standard value of 2.1 ($p < 0.05$). Therefore, we can conclude that NH2 does not hold. Similarly, we can show can the NH3 and NH4 does not hold either. Using ANOVA test, we can also verify similar hypotheses about question topics: Number of replies when tagged (NH5) or not tagged (NH6) does not depend on question topic. The number of persons tagged in each question does not depend on question topic (NH7).

For example, with NH6, $df\,(among) = 9$, $df\,(within) = 847$, $F = 3.1$, which is above the standard value 2.1 for $p < 0.05$. Thus, we can conclude that NH6 does not hold and the number of replies in untagged questions depends on the question topic. We can show in similar ways that NH5 and NH7 do not hold either. So, all these tests show that there are statistically significant implications for obtaining replies in response to queries in social media due to tagging other users in those queries. However, ANOVA test does not show for which types/topics there is a significant difference in the number of replies, people's rationale behind these differences, and their choices in this regard. We designed the second phase of the study to investigate this.

4 PROBING INTO TAGGING BEHAVIOR IN FACEBOOK

We made a request for volunteers through a research group, from which we selected 10 enthusiastic participants (4 females, 6 males) from two universities in [removed for anonymity]. All our participants (referred as P1-P10) had more than 150 friends in their Facebook profile (average 270) and use Facebook regularly in their day-to-day life. Our participants had many of their friends in common, as they belonged to different academic-years in two institutes. In total, we could interact with about 2000 unique Facebook profiles through these 10 volunteers.

The second phase of this study involved a controlled experiment of social media question asking. The

participants were asked to post questions on their social networks (Facebook). They were given a set of examples of questions containing one example from each type and topic, as classified by Morris et al. [18]. They were requested to post at least one question from each type and topic over the one-month period, posting at most one query per day (Figure 3 shows an example). They could choose their own questions; the set of questions we gave them was for exemplary purpose only. They were requested to tag their friends in those questions, if they think it appropriate. Existing studies in SMQA often have used this method for data collection (e.g., [20]).

We monitored the activities of our participants passively and did not give further instructions over the next one-month period. They were in our friend lists on Facebook, so we could see the questions they posted and the responses. We collected the queries and responses in the same way as mentioned in the previous section. After one month, we informed our participants that the study is over and though not all of them completed the task fully, we decided to end it there and analyzed the data that we obtained. Later we meet with our participants for a semi-structured interview session that lasted for 30- 45 minutes each. We used the questions they asked and the responses they received during the interview for provoking discussion. The interview was audio recorded, translated, and transcribed in English. We used thematic analysis to identify recurring themes in these interviews. Both quantitative and qualitative data of this phase of the study is presented in this section.

Figure 3: An example of questions by our participants. Translated from Bangla to English, it reads, "Which is the best restaurant for Kebab in Dhaka?" The tags are removed for de-identification.

4.1 Tagging Preferences for Various Question Types and Topics

First of all, we investigated tagging preference of our participants based on question type (Table 3) and topic (Table 4). Factual knowledge, invitation, and social connection were the types where they tagged some people in many cases. We note the difference from our earlier data set (Table 1) where people did not tag others for factual knowledge-oriented queries. The average number of tagged persons in these categories were 1.8, 2.9, and 2.05 respectively. Participant did not want to tag people for rhetorical or opinions, similar to real-life settings (Table 1). So, in our interviews with participants, we focused on what they considered and how they choose people to tag in their questions (Section 4.2).

Tagging behavior varies with question topic also, as our participants revealed. Shopping, places, technology are the most common topics where our participants tagged people mostly. They showed leniency to tag anyone in ethics & philosophy, entertainment, and home-related topics. The main reason participants mentioned was that they either ask questions personally to their friends if they need assistance specifically from that person, otherwise they seek generic opinions from anyone in their friend list.

Table 3: Analysis of tagging for different question types in our controlled study

Question Type	No. of Queries	No. of Tagged Queries	% of Tagging
Recommendation	17	2	11.8
Opinion	13	1	7.7
Factual Knowledge	28	14	50
Rhetorical	11	0	0
Invitation	9	4	44.4
Favor	7	1	14.3
Social Connection	14	6	42.9
Offer	7	1	14.3

Table 4: Analysis of tagging for different question topics in our controlled study

Question Topic	No. of Queries	No. of Tagged Queries	% of Tagging
Technology	28	10	35.7
Entertainment	7	0	0
Home & Family	9	1	11.1
Professional	6	1	16.7
Places	5	2	40
Restaurants	15	5	33.3
Current events	19	6	31.6
Shopping	9	4	44.4
Ethics & Philosophy	8	0	0

4.2 Rationale for Tagging Specific Persons: Relationship vs. Expertise

Our interviews revealed interesting user behavior regarding tagging in Facebook posts. Our participants explained that unless it is a very special topic and they are confident that some specific person among their acquaintance might know about that question, expertise on that topic-area is not a significant factor in tagging people, as was assumed in some earlier designs [10]; rather than social bonding between them is of paramount importance. It can be evident from our user data that the same person is tagged multiple times for different types and topics of questions by our participants. When asked about this, our participants mentioned:

"*He is my best friend. I gossip with him, share my problems and moments of glory with him. Every day we pass a lot of time together at the University and outside. So, whenever I am facing a query, I do remember him. It is not that I think he has the best knowledge on that, but he is the first person I can think of.*" (P3)

This was common for all of our participants. They also did admit that outside the social network, their first point of communication might be different, for example, close family members who do not use Facebook, but even in those cases, relation gets higher priority than expertise.

Things do change for specific or special areas, where they think that not too many people in their friend-list might know about it. There are also geographic preferences if the query depends on local information: "*I chose him because he has recently visited [removed]. So, he must have current information about accommodation and local details.*" (P1)

We asked our participants about when they think expertise is of consideration in SMQA. They opined that expertise can be important for questions related to factual knowledge, recommendation, opinion, etc., though in most cases they preferred people they have a close association with. For favor or social connection, they considered the relationship between the tagged persons and themselves as the only thing to consider. If other people respond voluntarily, they accept their helping hands with gratitude, but is it not an expectation:

"*Look, I have more than 600 friends in my Facebook profile. I do not know each of them personally. There are people from my class, friends of friends, etc. There are people that I have never meet, distant family members, every kind of. Though I appreciate reaching the right person for my queries if it is only an information, but I do not feel good about asking a favor of someone I do not know personally.*" (P9)

This explains the anomaly about tagging behavior in seeking factual information in the two phases of this study. While tagging friends for factual information, our participants were less concerned about relationship than about expertise. Hence, during the study period, they tagged some of their friends, while in real-life data, people appeared to remain open about getting reply from anyone in their social network. We discuss the implications of this in later sections.

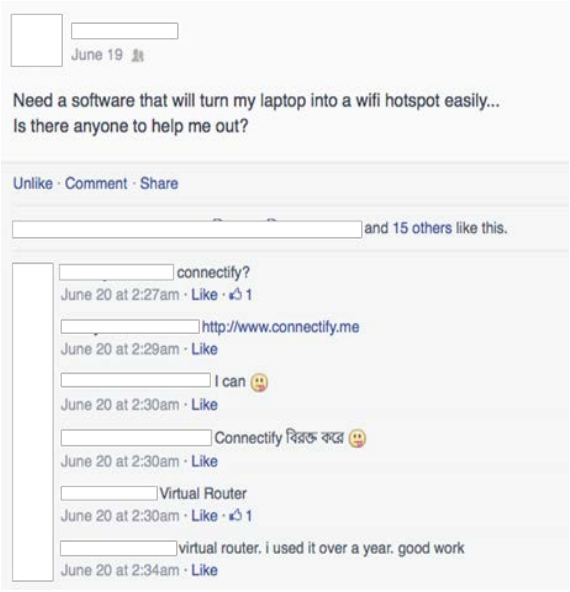

Figure 4: Another example from study participants. The tags are removed for de-identification.

4.3 Rationale for Tagging Specific Persons: Temporal, Spatial and Other Factors

Our participants also highlighted various temporal, spatial, and other factors that they considered while tagging a friend in their query. First, the participants considered the temporal factors based on the time zone of their friends, their working hours, and also based on their personal habits. They consciously avoided tagging someone who might be in their office or sleeping: "*Tagging a friend is like sending an SMS, their phone will likely issue an alert. I will never tag a friend if I know they are at work or are asleep*", P4 explained, "*as more and more of my friend are living abroad, I always check the time in their locality before I make any contact.*" Interestingly, these temporal factors often also consisted of knowing their friends' personal habits and other not so apparent contexts. For example, in one instance, P4 wanted to tag her close friend for a quick information, but she did not do so as they worked closely together for an assignment in the night before and assumed that she might be asleep. These sorts of contextual information can be hard to obtain for an automated process.

Our participants also revealed some complex and subtle issues related to privacy in their tagging activities. They often anticipated what others would think about

why they tagged a particular person in their query: "*I wanted to tag [name] in this question, in fact I did, but later removed the tag. My other friends will think that I am treating this one friend specially.*" (P5). When asked if the idea of automated tagging will solve or exacerbate the problem, she was a bit undecided: "*they will banter around why [the algorithm] chose this particular friend, but at least it was not me!*" Some of our participants avoided tagging any particular person in questions they can considered even subtly sensitive – for example, subjective or rhetorical questions related to politics, religion, even gender issues.

5 DISCUSSIONS

So now that we have presented findings from both - real-life data samples and from our control study, we discuss how our findings provide newer insight into understanding users' tagging behavior in SMQA and what it means for future developments in this area.

Our findings (phase 1) show that tagging has a statistically significant impact on the amount of attention one particular post receives. There is no way in most of the widely used social media user interfaces to know how many users have viewed a particular post, let alone who those users are. Therefore, we can use the number of replies on a post as a metric. Our results show that tagged posts gain more attention than the untagged ones with respect to this metric. There is evidence in our collected data that shows that the number of responses in SMQA depends on the type and the topic of questions, irrespective of the presence of tags with those questions.

Also, when the questions are tagged, the number of tags associated with them depends on the question types and the topic. In both phases of our study, we saw that the question types related to invitation, favor, and social connection were often tagged whereas rhetorical questions are not tagged almost ever in any of the steps of the study. However, there is an interesting difference between the findings from two steps of our study. The percentage of the tagged factual knowledge-based questions in first phase of our study (real-life data) was much lower than the percentage of similar type of tagged questions in second phase of our study (controlled experiment data). We understand that this could be due to observation bias as our participants knew the purpose of the study is to investigate tagging behavior. However, our interview data clarifies that the participants were open to getting replies from anyone with relevant expertise to answer these factual queries – hence this could be an important application for algorithmically generated tagging for SMQA.

Our findings contradict with some of the existing literature. Whereas the existing literature emphasizes on the expertise on the topic of the questions [10, 24], we found that strength of social ties is more important from the asker's perspective. We found that even when a user knows in his/her social media an expert person about the related topic of the question, he/she does not tag that expert if they are not close enough. That means, in SMQA tagging, the users value closeness over expertise (which again varies according to question topic/type).

The possible explanation behind gaining more responses on a question by tagging other users is that the algorithm used for designing users' newsfeed is not optimized for SMQA. The reason behind why the users value closeness over expertise might be related to various aspects. The users think context to be very important in SMQA. They might feel more comfortable to contact with their close friends than to contact with acquaintances. Urgency associated with a question asked on SNS might also influence whom the users will tag.

6 DESIGN IMPLICATIONS

In this section, we discuss implication from our findings for algorithmically tagging or suggesting people in SMQA to enable the users match with their most compatible answerers. SNS developers can consider these implications while designing their system and customize their algorithms to forward queries to their appropriate audience. On the other hand, designers for automated tagging consider those to identify and tag appropriate people, thus avoiding the pitfalls of the existing works.

6.1 Avoid False Positives

Unnecessary tagging can be very annoying, as identified by Hecht et al. [9] and our participants. Tagging a person who is not willing to answer (e.g., not having the right expertise, unbeknownst to the asker, not willing to engage in an interaction, etc.) can be irritating to both the asker and the tagged person, resulting in degradation of social relationships between them. On the other hand, failure to tag any person might even go unnoticed by the asker. So, it becomes of paramount importance to identify if tagging can assist the asker at all. Designers of automatic tagging systems need to be aware of the difference in mindset between users when the use search engines vs. SMQA. In SMQA, they expect interactions with another human, hence having no algorithmically generated suggestion is more acceptable.

Also, not all sorts of questions are suitable for automatic tagging. Existing works in this field did not take this into consideration (e.g., [10, 24]), leading to their negative user acceptability. Instead of being pro-active, the system might suggest the user to tag the suitable persons it identifies and let the users choose their options. In this way, it is possible to avoid false positives and still satisfy user requirements.

One can take another step to avoid unnecessary tagging. Instead of tagging while users ask questions, a system can wait for some time and if the query does not get a satisfactory reply after a time-threshold, the system can tag a few people. While doing so, the system can follow the approach by White et al. [24] and increase the number of people tagged step by step until the user gets a satisfactory reply. Users of SMQA usually show patience while waiting for replies, as identified by Morris et al. [17, 18] and our data, so these measures are applicable.

As our study have shown, users tagging behavior changes with the question topic and type, and the number of persons tagged varies accordingly. Therefore, some static configuration on this issue will not work, but we need to decide intelligently based on previous experience and asker's preferences. Tagging people in a progressive way might be a solution, as mentioned before.

6.2 Combination of Expertise and Relation

Our study highlights that expertise itself cannot be the only criteria for selecting the appropriate person to tag, as also indicated by previous works and verified by our participants. First of all, we need to consider the social nature of SMQA and take it into consideration. The social connection between users enable their friends to better understand the context of a question, making them a more suitable resource to reply. On the other hand, tagging a person who has close social ties, but little or no interest/knowledge in the respective field is not suitable either. Users social community needs to be analyzed carefully to model the relationships among different members in that community. For example, it may not be the same person that a user seeks to answer a family-oriented question and a technology-oriented query. Question types, topics, and relationship - an empirical relationship between these three (at least) are required to successfully identify the right persons.

This is by no means an easy feat. However, social networking sites enabled us to have these data in a never-before-seen scale and could be a very good starting point in this respect. We aim to delve further in this direction for our future works.

6.3 Privacy and Tagging

There could be potential implications for automatic tagging in social networks. In many popular social networking sites (e.g., Twitter, Facebook, etc.) posts are usually visible to all the friends (also can be public) hence the implication for automatically tagging a friend might not be obvious. Though anyone in the asker's friend list can see his/her post, tagging someone in that post specifically draws their attention. Other users might also make implicit assumptions about their relationship due to this tagging. This can be a problem for some cases and needs to be avoided. There can be sensitive topics of questions that one might not feel comfortable to specifically ask some friends or family members, for example. A possible solution might be to design a system that shows a list of potential people to tag and let the user choose or discard from that list. Also, as our participants have suggested, the list of algorithmically tagged persons needs to be explicitly stated to discern them from the people that users tag personally.

6.4 Spatial and Temporal Considerations

There can be space or time considerations involved with tagging people. People from one's social network in Facebook can live in geographically dispersed all over the world and thus live in different time zones. Therefore, for queries that require quick response, it might be infeasible for some people to respond due to the time-zone difference. Again, it depends on personal habits, but the data available from our social network can assist to develop intelligent systems that take this into account and tag people accordingly. All the existing systems lack this feature, but it can be achievable with relative ease.

7 CONCLUSIONS

This paper presents findings from both real-life data and a controlled experiment to find out the users' expectations and attitudes towards tagging other users for obtaining effective responses to their queries asked through social media. We present findings that at some time contradicts with the existing works about target users in SMQA, but at other times provide deeper insights about users' activities related to tagging in SMQA. We specifically focus on the impact of tagging, and take different factors into account - the types and topics of questions, tie-strength, temporal factors, etc. and its impacts, on response rate, response time, social acceptance, etc. These findings can provide valuable insights into design of SNS interfaces and user experience modeling for social media question asking.

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