

## A Tool to Assist the Social Search on Facebook

Cleyton Souza, Jonathas Magalhães, Evandro Costa, Joseana Fechine, Ruan Reis

Laboratory of Artificial Intelligence - LIA  
Federal University of Campina Grande  
Campina Grande, Brazil

cleyton.caetano.souza@gmail.com, jonathas@copin.ufcg.edu.br, evandro@ic.ufal.br, joseana@dsc.ufcg.edu.br,  
ruan.victor.amorim@ccc.ufcg.edu.br

**Abstract**— Sharing questions is a new way of getting answers on social networks. However, the usual strategy of broadcasting questions could be optimized. In this work, we propose a Social Query mobile app to assist users sharing their questions on Facebook. Before publishing the question, the app will guide the user through some steps to enhance the probability of getting an answer by someone. It is a tool to help the users phrasing their problems, restrict the social search to a certain demographic group and find people to help them. As far as we know, this is the first work to merge these three aspects of the social search. To validate our proposal, we run a questionnaire so that people could value what we are offering, and we received great feedback.

**Keywords**-social query; social search; query routing; expertise finding; Facebook; system.

### I. INTRODUCTION

Currently, the Social Networks (SNs) is the most popular service on the Web, surpassing even E-mail [1]. In this scenario, Facebook stands out as the most popular social network throughout the world: it has more than one billion users [2]. If Facebook were a country, it would be the third largest country in the world, bigger than the U.S. and Indonesia; and if it keeps growing in population, in three years, it would be larger than China [3]. Nowadays, one sixth of the world has a Facebook account [2].

These SN sites were first designed to allow remote interaction between geographically dispersed people [4]. One of the goals of interacting with other people is the knowledge exchange [5]. Thus, naturally, a version of knowledge exchange emerged inside these virtual spaces: users using the available features to exchange knowledge and find information through online SN.

One of the ways of knowledge exchange is the *social query*: people, trying to take advantage of the *crowd's knowledge*, share problems with their contacts, usually in the form of a question, aiming to find a solution [6]. It is an attempt to transform social relationships in practical knowledge [4]. This strategy is particularly useful when the solution requires a degree of personalization, maybe impossible to reach through other channels, because it is assumed that the friends of the questioner hold privileged information about his/her preferences [6][7].

In this work, we aim to improve the social query process. Broadcasting questions to all contacts has become a popular strategy to share problems on SNs. However, this is

not the best way to benefit from the social capital [8], specially, in context of the most popular SN. Facebook feed works differently from Twitter timeline; the feed showed to each user is based on a personalized algorithm [9]; therefore, when users broadcast messages, there are no guarantees that these messages will be seen by all their contacts. Some studies defend that directing questions to experts is more efficient than broadcasting, but knowing to who the question should be directed is not always easy [10]. In addition, the way the question should be formulated could be decisive to receive an answer or not. Teevan et al. [11] found that characteristics of the question itself predicted the quality, quantity, and speed of responses. Thus, it is noticed that turning social relationships into practical knowledge is not a simple task and several factors could and should be considered in order to guarantee a solution to the problem.

In order to help users, we propose a mobile app called *Social Query*. It will guide the users through some steps before the disclosure of the questions on Facebook, enhancing their chances of getting answers. We propose a system to help people to find other people to help them. It is not only an Expertise Finding System (EFS), as most people can think, but also a tool to assist users to formulate their problems and restrict the social search to a certain social group. As far as we know, this is the first work to merge these three aspects of the social search. Through this app, the users inform their questions and receive suggestions to increase the chances of receiving an answer. The suggestions range from tips to rephrase the question to indications about whom probably might know the answer (a person or group), so the user could direct the question to specific contacts, ensuring that it will be visualized by them.

We used a questionnaire to get feedback about our proposal. Through the questionnaire people could express their opinions about the functions available in the Social Query app. The results were excellent; people considered useful most of the available functions, but we highlight the acceptance of the Expertise Finding mechanism and the Filtering mechanism.

The remainder of this paper is organized as follows. First, we will present a brief review of literature about the practice of sharing questions on SNs; next, we will detail how our proposal works; then, in Section IV, the questionnaire results are presented; later, we close with our conclusions and future work proposals.

## II. RELATED WORK

The habit of sharing questions on the web was born on Community Questions and Answering (CQA) sites and was extended to SNs [12]. Asking a question on Facebook, for instance, is an explicit action performed by users in order to convert the social relationships maintained on the site into actionable information and other social capital outcomes [4].

The broadcasting feature, a key component of most SN sites, allows users to distribute content to their network, including requests for informational or emotional support; this ability is particularly helpful when the information is held by weak ties only available through the SN [4]. Both technical and social features made SNs the ideal place to share questions: (1) the possibility of contacting a large and diverse audience through only one post is quite useful when we are looking for information [13], (2) the fact that the majority of this audience is composed by people who know us [12], and (3) the possibility to reach weak ties [4].

Morris et al. [6] presented statistics confirming social query as a viable method to obtain answers online. In their case study, 93.5% of users had their questions answered after sharing them (in online SNs or using status update in Internet Messengers) and these responses, in 90.1% of the cases, were provided within one day. The main motivations pointed by the users who practice the social query were (1) their trust on their contacts and (2) the hope of a personalized answer. These motivations highlight the advantages of posing questions on SNs compared to more generic CQA sites; in addition, some patterns identified by the research on information seeking suggest that certain information needs, such as those revolving around quotidian occurrences, are more commonly solved by individuals that one already knows [14].

Nichols and Kang [8] confirmed that directing questions significantly increases the response rate, while the number of the answer depends to who the question will be directed to. In this sense, EFSs play an important role: if we identify an expert on the topic of the question and direct it to that expert, the answer would come faster and with higher quality [15].

The process of directing questions to appropriate helpers is known in literature as Query Routing (QR) and there is a vast research about this topic, especially when we looking the CQA's context [5]. However, most work about QR concentrates on the Expertise Finding (EF) aspect of the problem. In addition, it is usually considered a *global context* of candidates. However, our goal is the detection of specialists into the set of the questioner's friends (*local context*). Thus, the "level" of expertise that characterizes someone as "an expert" will constantly change. Moreover, EF often considers mainly the expertise about some topic; what we propose is taking into account several factors to improve the probability of finding relevant information through the help of friends.

In [10], we had proposed a QR system that routes questions to followers on Twitter based on three criteria: knowledge, trust and activity. However, in this work, we are not only proposing a system that recommends someone, but that also assists the users in the process of sharing their

problems. (a) Our app will (a) analyze the question and suggest modifications, (b) suggest to restrict the search for help to a certain group of friends, and (c) will suggest people based in their bounds, availability and expertise. As far as we know, this is the first work to merge these three aspects of the social search. Next, we will detail how our proposal fits into the Q&A process.

## III. SOCIAL QUERY ON FACEBOOK: MOBILE APP

The Social Query app was developed in Android. It helps users to use the potential of their social capital to transform social connections in practical knowledge. In the next sections, we will detail how our app works and the ideas behind its views.

### A. First View

The First View of the app is the Login page, presented in Fig. 1 (a), where users must inform their Facebook credentials (b).

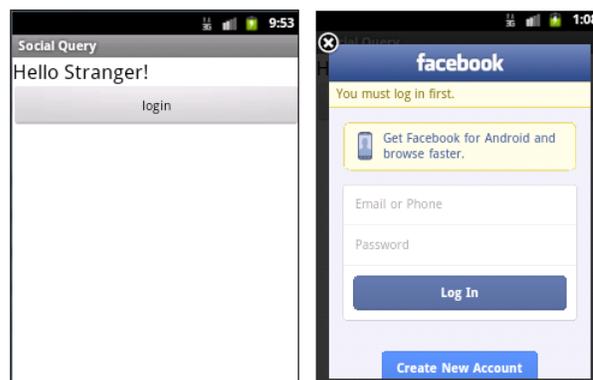


Figure 1. (a) First View and (b) Facebook's Mobile Login Dialog

After logging in, users must give us permission to access the information of their Facebook accounts and to publish content in their feeds, as presented in Fig. 2 (a). After that, they are directed to the Main Page, as presented in Fig. 2 (b).

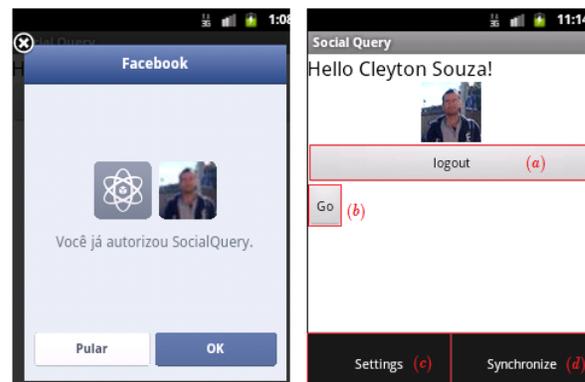


Figure 2. (a) Permission's Dialog and (b) Main View

The options in the Main page are Logout of the app (a); go to Settings (c); Synchronize again with the Facebook

account (d); and Go make a question (b). The Logout option directs users to the Login page again. The Settings option allows users to choose what EF model to use (currently, there are three available) and to define Filters to the EF search. The Synchronize option is an opportunity for users update the app information about them (catch more recent information about them, their contacts and new connections); it will start the same thread initiated after the Login. The Go button guides the users to the main functionality of the app. The next section will detail how it works.

**B. Q&A Process**

After clicking the Go button, users are directed to the New Question View, where they can inform their question. Fig. 3 illustrates this use.

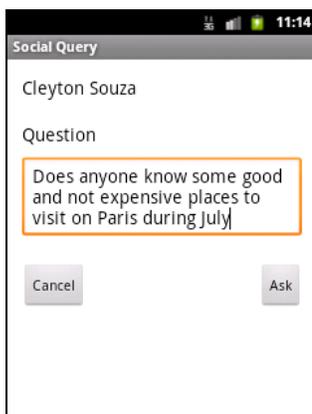


Figure 3. New Question View

In Fig. 3, the user ‘Cleyton Souza’ has a question about places to visit in Paris. After typing the question, the user will click the Ask button, being directed to the Tips View, as presented in Fig. 4.

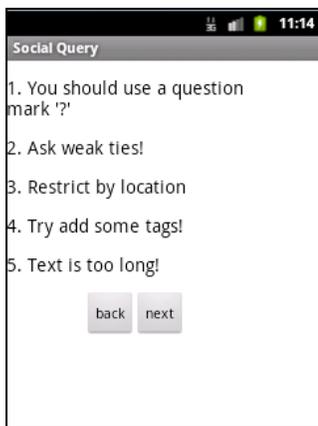


Figure 4. Tips View

Fig. 4 illustrates some of the tips that could be given to the user. Basically, we analyze the text of the question searching for specific information (e.g., terms or mentions to place or people); next, we select some pre-established tips to show users, who has the option to follow them or not.

The decision about which tips will be presented is based on the characteristics of the question, determined by our *Question Analyzer*. Teevan et al. [11] found that a concise style of question-asking, a defined scope (or audience), and the inclusion of a question mark were associated with more and higher quality responses within shorter periods of time. The Question Analyzer processes the questions and extracts their characteristics. Then, it associates these characteristics with pre-established tips, which were decided based on literature review and interviews conducted by us.

The chosen tips are displayed to users. If they decide to follow any tip, they must to click the Back button (to edit the question text) or Settings menu (to turn on some filters). After that, they can click the Next button to be directed to the Recommendation List View, where they choose who they want direct the question to. This view is presented in Fig. 5.

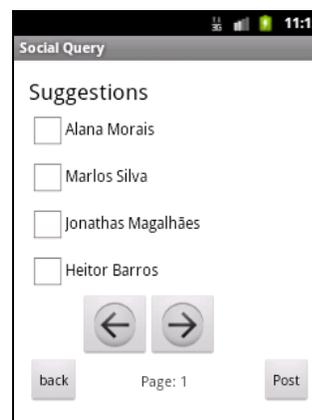


Figure 5. Recommendation List View

Friends of the questioners are ordered according their score of utility calculated by the EF model chosen on Settings. The users check the people and click the Post button. Then, the Social Query app posts on the Facebook users’ feed the question, but tagging the friends that they checked.

**C. Settings**

In Fig. 6, the Settings View is presented, where users can edit the features of the social search.

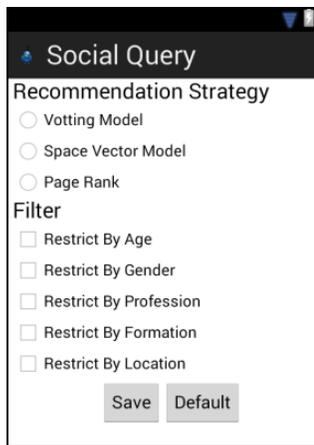


Figure 6. Settings View

Currently, the Settings limit to choose the EF model and establish filters to the Expert Search. The EF model is the technique that will be used to represent the contact’s expertise. The filters to Expert Search restrict the recommendation to a certain group of contacts.

In the current version of the app, there are three EF models implemented, next they will be detailed and after the five Filters available will be explained too.

1) *Expertise Finding Models*

a) *Voting Model*: Proposed by Macdonald and Ounis [17], it considers the task of ranking experts as a voting problem. The profile of each expert candidate is associated with a set of documents that represents their expertise. The request for expert is assumed as a query into a search engine that retrieves some of these documents. Each retrieved document is associated with one or many users and counts as an implicit vote for them. The ranking of experts is based on the total of votes of each candidate. Several strategies could be used to retrieve documents, associate the document with the users or weighting the votes.

b) *Vector Space Model*: A classical approach from *Information Retrieval (IR)*, was originally proposed by Salton et al. [18]. *The idea behind the model is to represent content in multidimensional vectors. In our context, the vector represents the content associated with each user, the coordinates represent the words, and the coordinate values are calculated using TD-IDF. The expertise score is the similarity between the expertise profile and the question vector using cosine similarity.*

c) *PageRank*: It is a classical algorithm that measures the importance of a node counting the number and quality of nodes pointing to it [19]. If we consider that the scenario where “a user X, author of question Q, receives an answer A, from user Y” represents a graph like  $X \rightarrow Q \rightarrow A \rightarrow Y$ , that could be simplified to  $X \rightarrow Y$ . One of the goals of PageRank is to estimate our probability of randomly getting in a node; the higher this probability, the greater the chances the node of being a good recommendation.

2) *Filters*

The Filters are used to restrict the social search to a certain social group. Currently, there are five Filters implemented. Restrict by: age, gender, profession, formation and location. In the current version of the app, each filter restricts the expert search to people with the same characteristic of the user. For instance, if the user is a man and he checks the “Filter by gender”, it will be only recommended men; if he lives in Paris and he also checks the “Filter by location”, it will be only recommended men who live or lived in Paris too.

However, for next releases of the app, we are planning the improvement of the filter mechanism. One of the improvements will be allowing the users to choose the filter value (e.g., the hometown city that they want use to restrict the search). Another improvement, it is the prediction the ideal filter value (e.g., find what would be the most indicated hometown city). In literature, there is already some research in this direction [16]. In addition, we are constantly thinking about new Filters.

IV. EVALUATION

To validate our tool, we shared a questionnaire in Facebook groups. The questionnaire was answered by 250 volunteers. To know our volunteers, the first part of questionnaire asked them about their experience with SMQA; the second part requested them to value the main function of the Social Query app.

Among the volunteers, 159 confirmed that had already shared questions through an SN. For this reason, only their answers were considered for the questions about their SMQA experience. Regarding their habits before sharing the question, most volunteers search for the answer by themselves before turning to friends for help, only 5% of them admitted that they go straight to SNs. In addition, most people (84%) often think carefully about how to phrase the problem. It is already known that a short period and a well-defined audience are associated with better answers [11]. However, only 1/3 thinks about people they know who probably can help. Moreover, 1/3 of volunteers also make the “mistake” of being thorough. Regarding their opinion about how easy is finding help through SMQA, 130 (81%) consider it easy while 29 (19%) consider it hard. Moreover, 94% said that they usually do not need repost their problem to receive an answer.

Then, volunteers evaluate the aspects of the application described in previous sections. Initially, we asked them to directly value the functions of the app. There was a template question like “How useful would be this [function]?” followed by one of the functions of the Social Query app. The options were “Don’t know”, “Somewhat Useful”, “Useful” and “Very Useful”. The results are summarized in Fig. 7.

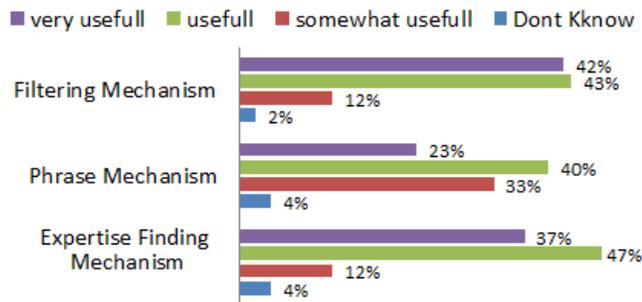


Figure 7. Results of Questionnaire (A)

As can be seen in Fig. 7, most of functions were considered, at least, useful. We compare these values using a one-tailed-right binomial test and we found statistical significance in “Useful” percentage for all functions ( $\alpha=0.01$ ). This means that the “Useful” appearance is statistically greater than “Somewhat Useful” and this should continue regardless of the amount of feedback that we received and regardless the function. In addition, the most useful functions, according the answers, were the Expertise Finding mechanism (84% of aggregate usefulness) and the Filtering Mechanism (85% aggregate of usefulness).

Regarding the Expertise Finding, we asked volunteers about what they are looking for in answers from their Facebook friends. “Truth” (27%) was the most desired characteristic followed by “Detail” (21%). “Personalization” was the less desirable characteristic (2%). This, particularly, was an unexpected result, because, many appreciated that their private SN was familiar with their additional context, such as knowledge of their location, family situation, or other preferences [6]. The popularity of these characteristics that reflect a mastery over a subject (Truth and Detail) results in a need to prioritize expertise rather than other more subjective criteria (availability, trust, etc.) when estimating the utility of each candidate.

Finally, we asked if they believed that certain questions were implicitly restricted to certain kind of people. We used a template question like “Do you agree that some questions can only be answered by a certain [characteristic]?” followed by each Filter option. This question aimed to evaluate the volunteer’s perception about the utility of the Filtering mechanism and their results are summarized in Fig. 9.

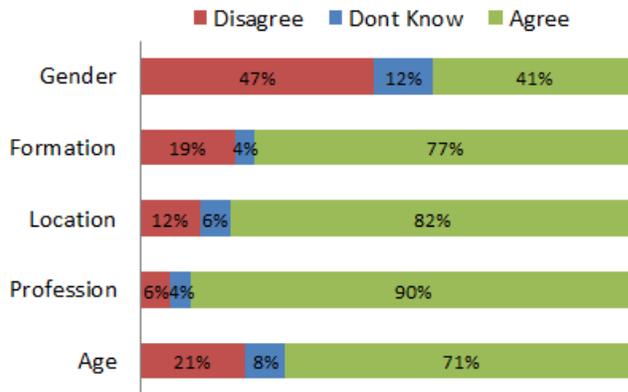


Figure 8. Results of Questionnaire (B)

In general, all the Filters were considered useful by most of volunteers, except by the gender filter, which was a polemic subject. We observe the highest divergence between male and female opinion. We believe that this rejection was due to the sexist aspect of our question. This may be absurd, but men and women may have understood that they were not able to answer questions made by the other gender and rejected the filter by this reason. But, this is just a guess; we could not confirm this without individually interviewing each respondent. The fact is that the Gender filter was not well received by our audience

## V. CONCLUSION AND FUTURE WORK

In this work, we presented the Social Query app to assist users to search for information on SNs. While most part of previous work focused on the Expertise Finding mechanism, we propose a tool to help the users through several steps of the social search process. First, our solution helps the users to rephrase the questions enhancing its chances of be answered. Second, the app offers three different approaches to finding experts. Last, there is an option to filter the expert finding search to a certain group with the same demographic characteristic of the questioners (age or gender, for instance).

To evaluate our proposal we run a questionnaire, which was answered by 250 Facebook users. Through the questionnaire, these users could give their impressions about the functional aspect of the Social Query app. The results were excellent. The main functions (Expertise Finding mechanism, Filtering mechanism and Rephrase mechanism) of the app in average were considered at least useful by more than 40% of users. In addition, we obtained great feedback that allows us to think about improvements to our proposal.

As future work, we are planning the following improvements: (1) use of other Expertise Finding models, some of them considering semantics; (2) enhance the Question Analyzer, besides suggesting changes in problem specification, automatically applying some or all of these changes; (3) improve the Filtering use to specify the input; (4) allow the user to maintain a list of contacts; (5) allow users to maintain lists of friends; (6) considering additionally the reputation of the users, based on previous; and (7) make friends of friends available as expert candidates.

## ACKNOWLEDGMENT

We want to thank people who answered our questionnaire.

## REFERENCES

- [1] T. Wayne, "Social networks eclipse e-mail", May. 2009. [Online]. Available from: <http://www.nytimes.com/2009/05/18/technology/internet/18drill.html> [retrieved February, 2014]
- [2] M. Ross, "Facebook turns 10: the world's largest social network in numbers," Feb. 2014. [Online]. Available from: <http://www.abc.net.au/news/2014-02-04/facebook-turns-10-the-social-network-in-numbers/5237128> [retrieved February, 2014]
- [3] G. McMillan, "If Facebook was a country, it'd be larger than China in three years," Feb. 2013. [Online]. Available from: <http://www.digitaltrends.com/social-media/facebook-could-be-larger-than-china-in-three-years-time/> [retrieved February, 2014]
- [4] R. Gray, N. Ellison, J. Vitak, and C. Lampe, "Who wants to know? question-asking and answering practices among Facebook users," Proc. 16th Conference on Computer Supported Cooperative Work (CSCW), ACM Press, 2013, pp. 1213–1224.
- [5] B. Furlan, B. Nikolic, and V. Milutinovic, "A survey of intelligent question routing systems," Proc. 6th International Conference Intelligent Systems (IS), IEEE Press, 2012, pp. 14–20.
- [6] M. Morris, J. Teevan, and K. Panovich, "What do people ask their social networks, and why?: a survey study of status message Q&A behavior," Proc. 28th International Conference on Human Factors in Computing Systems (CHI), ACM Press, 2010, pp. 1739–1748.
- [7] G. Manoranjitham and S. Veeraselvi, "Mobile question and answer system based on social network," International Journal of Advanced Research in Computer and Communication Engineering, vol. 2, September 2013, pp. 3620–3624.
- [8] J. Nichols and J. Kang. "Asking questions of targeted strangers on social networks," Proc. 15th Conference on Computer Supported Cooperative Work (CSCW), ACM Press, 2012, pp. 999–1002.
- [9] L. Magid, "Facebook tweaks news feed algorithm again," Jan. 2014. [Online]. Available from: <http://www.forbes.com/sites/larrymagid/2014/01/21/facebook-tweaks-news-feed-algorithm-again/> [retrieved February, 2014]
- [10] C. Souza, J. Magalhães, E. Costa, and J. Fechine, "Social query: a query routing system for Twitter," Proc. 8th International Conference on Internet and Web Applications and Services (ICIW), IARIA Press, 2013, pp. 147–153.
- [11] J. Teevan, M. Morris, and K. Panovich, "Factors affecting response quantity, quality, and speed for questions asked via social network status messages," Proc. 5th International Conference on Weblogs and Social Media (ICWSM), AAAI Press, 2011.
- [12] C. Souza, J. Magalhães, E. Costa, and J. Fechine, "Routing questions in Twitter: an effective way to qualify peer helpers". Proc. International Joint Conferences on Web Intelligence (WI) and Intelligent Agent Technologies (IAT), IEEE Press, 2013, pp. 109–114.
- [13] M. Burke, R. Kraut, and C. Marlow, "Social capital on Facebook: differentiating uses and users," Proc. Conference on Human Factors in Computing Systems (CHI), 2011, pp. 571–580.
- [14] R. Savolainen, "Everyday life information seeking: approaching information seeking in the context of way of life," Library & Information Science Research, vol. 17, 1995, pp. 259–294.
- [15] C. Souza, J. Magalhães, E. Costa, and J. Fechine, "Predicting potential responders in Twitter: a query routing algorithm," Proc. 12th International Conference on Computational Science and Its Applications (ICCSA), Spring Press, 2012, pp. 714–729.
- [16] D. Horowitz and S. Kamvar, "The anatomy of a large-scale social search engine," Proc. of the 19th International Conference on World Wide Web (WWW), ACM Press, 2010, pp. 431–440.
- [17] C. Macdonald and I. Ounis, "Searching for expertise: experiments with the voting model," The Computer Journal, vol. 52, 2009, pp. 729–748.
- [18] G. Salton, A. Wong, and C. Yang, "A vector space model for automatic indexing," Communications of the ACM, vol. 18, 1975, pp. 613–620.
- [19] S. Brin and L. Page, "The anatomy of a large-scale hypertextual web search engine," Journal Computer Networks and ISDN Systems, vol. 30, April 1998, pp. 107–117.
- [20] G. Comarella, M. Crovella, and V. Almeida, "Understanding factors that affect response rates in Twitter," Proc. 23th International Conference on Hypertext and Social Media (HT), ACM Press, 2012, pp. 123–132.