

Quality of Answers in Healthcare Social Question Answering

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Abstract. Healthcare Social Question Answering (SQA) services provide an open and free way to share knowledge and experience about health related enquires. Examples of healthcare SQA services are MedHelp, BabyHub and Drugs.com. The quality and the source of the questions and answers vary widely. Hence, we work towards identifying the factors that affect the quality of answers shared on SQA services. This paper thus facilitates the reuse of archived answers in health care SQA services.

Keywords. Healthcare social media, Social Question Answering, Regression analysis

Introduction

Healthcare Social Question Answering (SQA) services provide an open and free way to share knowledge and experience about health related enquires. Healthcare SQA services are refining the delivery of health services and forming the cornerstone for patient empowerment. User are now able to look for health related information, engage in communication about their health problems, share their guidance to their online friends who have similar issues, compare their treatment experience and the medication strategies they encountered [1].

Drugs.com is one of the most popular example of healthcare SQA services. The ever-evolving activities among public in healthcare SQA services ranges from questioning their doubts, sharing their reactions and playing an important role in users' health information inquiries [2]. Users health-related behaviors such as recreation, dietary, smoking, bedtime, hibernation, and alcohol consumption [3], are widely discussed freely in SQA services.

Reusing the knowledge collected is an important problem. In general, previous studies emphasized that modernizations fail to attain feasibility because the is a need to examine the connection between technology and users involved. Today, social media has empowered people to contribute their knowledge publicly making it available to reuse. But, the dangers and threats of imprecise diagnoses are formidable [4]. There is a need

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to aid in assisting and mining the content shared to make the process of retrieving quality content, relevant to users, easier. For millions of users who ask questions in a healthcare SQA service like Drugs.com, the answers for the past questions submitted comprise a valuable knowledge repository.

As the quality and the source of the questions and answers vary widely, there is a need to further study the relationship between the users and the content they post, particularly with respect to health-related questions and answers. Hence, the research question addressed in this paper is - “What are the factors that affect the quality of answers shared on SQA services in healthcare social media?”. This paper thus facilitates the reuse of archived answers in health care SQA services.

1. Methodology

We identified a set of features related to questions, answers and users to identify the features that affect the quality of answers. The features are based on Bian et al. [5], Agichtein et al. [6], and Angeletou et al. [7]. The features used to represent questions, answers and users are given in Table 1 and are mainly used to focus on intrinsic content quality metrics.

Table 1. Features related to the quality of answers

Category	Features	Description
Question	Number of answers for the question	Number of answers received
Answer	Accuracy	Correctness of the answer
	Number of words per sentence	Average number of words per sentence in the answer
	The Flesch–Kincaid (F–K) reading grade level	The FK reading score indicates the level of difficulty in reading
	Total positive votes	Number of positive votes for the answer
User	User Points	Number of points the user received

All the features were extracted from Drugs.com (Figure 1). Number of answers received for a question was used to related to the options a user had. It was also used to measure how the various answers were used for the evaluation of the quality of the answer itself. The accuracy or the correctness of the answer was evaluated by a medical expert by reading the question and its respective answer posted by users in the site. Accuracy is a feature used to depict the quality of the answer. Number of comments again relate to the popularity of the question. Word count stands for the number of words used in the answer for perceiving the length of the answer. The FK reading score indicates the level of difficulty in reading the answer. Votes received for the answer is the measure of positive votes received for the answer. User points relate to the number of points received by the user. The user points will relate to the ranking of the user.

We collected 625 questions, answers and related features for a preliminary test to identify factors affecting the quality of an answer. We recruited two health experts to read and evaluate the accuracy of the answers. Accuracy of the answer was rated from 1 to 5 based on the correctness of the answer to the posed question. The results obtained by analyzing the data based on regression analysis is detailed in the following section.

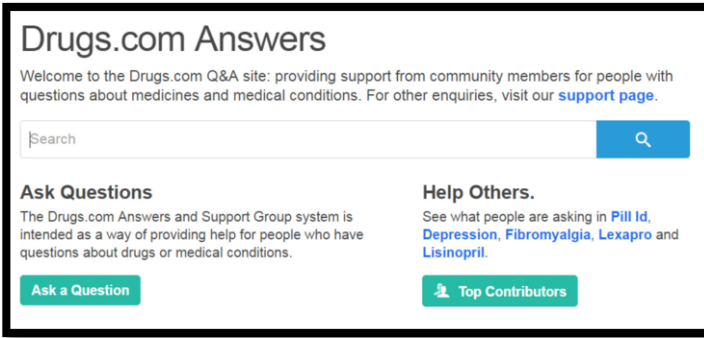


Figure 1. Drugs.com social question answering site

2. Results

For the regression analysis, accuracy of the answers was considered as the dependent variable. It was found that the dependent variable was significant (.006) with ANOVA.

Table 2. Coefficients of the features related to the quality of answers

Feature	Beta	t	Sig.
Number of answers for the question	-.159	-3.831	.000
Number of words per sentence	-.030	-.680	.497
The Flesch–Kincaid (F–K) reading grade level	-.058	-1.407	.160
Total positive votes	.044	1.054	.292
User Points	-.010	-.235	.814

a. Dependent Variable: accuracy

From the results detailed in Table 2, we found that the accuracy of the answer was dependent on the number of answers for the question. The number of answers received for a question was very much variable and depends on the question itself. The type of answers presented by various users was also very diverse. The second significant feature was the reading level followed by the total positive votes received by the answer. Reading level and total positive votes received are the two direct measures that relate to the quality of the answer itself. The last two significant features were the length of the answer and the user points. From the results, it was evident that the accuracy of the answer was independent of the length of the answer. Especially in social media, answers to health-related question vary with one word to a long story based on the user’s experience. Similarly, the users who are answering questions are of great diversity. They might be health professionals or experienced patients. Although the users earn points based on their participation, the users might be very instantaneous. Specially, in social media environment, trust is an important factor in contributing and collaborating [8].

3. Conclusion

Regression analysis was used in this study to model the dependent variable accuracy - relating to the quality of the answers, based on its linear relationship to one or more predictive features. Number of answers received, reading level of the answer and the positive votes received for the answer are found to be the three significant quality features of the answer. Based on the findings, this study, aides in mining the content shared by users in healthcare SQA service, to make the process of retrieving quality content relevant to users. The evaluation resulted in clear evidence of content features that contributed to the quality of answers in health care SQA services.

Implications from this study for theory and practice is that, by examining the connection between the quality of answers and the question answering process itself, it could help to better understand users' evaluation behaviors in relation to their preferred answers in health care SQA services. Findings from our study about answer quality assessment could provide insights for guiding healthcare SQA service designers to customize community support, motivate users to contribute and control the quality of the content shared.

References

- [1] John, B.M. & Wickramasinghe, N. 2016. *Prevalence of Social Question Answering in Healthcare Social Media*, Consumer Health Informatics, 235-251.
- [2] Zhang, J., and Zhao, Y. 2013. A user term visualization analysis based on a social question and answer log, *Information Processing and Management* (49:5), 1019–1048.
- [3] Hyypä, M. T. 2010. *Healthy ties: Social capital, population health and survival*. Springer Science & Business Media.
- [4] George, D. R., Rovniak, L. S., & Kraschewski, J. L. 2013. Dangers and opportunities for social media in medicine. *Clinical Obstetrics and Gynecology*, 56(3).
- [5] Bian, J., Liu, Y., Zhou, D., Agichtein, E. & Zha, H. 2009. Learning to recognize reliable users and content in social media with coupled mutual reinforcement. *In Proceedings of the 18th international conference on World Wide Web*, 51–60.
- [6] Agichtein, E., Castillo, C., Donato, D., Gionis, A. & Mishne, G. 2008. "Finding high-quality content in social media". *In Proceedings of the 2008 International Conference on Web Search and Data Mining*, 183–194.
- [7] Angeletou, S., Rowe, M. & Alani, H. 2011. Modelling and analysis of user behaviour in online communities. *In The Semantic Web-ISWC 2011*, 35–50. Springer.
- [8] John B., Gururajan R., Wickramasinghe N. 2016 *Prevalence of Social Question Answering in Health-Care Social Media*. In: Wickramasinghe N., Troshani I., Tan J. (eds) Contemporary Consumer Health Informatics. Healthcare Delivery in the Information Age. Springer, Cham