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Abstract. Twitter was used to a great extent by government, media and individuals to obtain and exchange information real time during emergency. In ambiguous situation where information is crucial, some misinformation may creep in and spread around by retweet. This paper discusses on Twitter issues in emergency situation. A survey was conducted to investigate user's decision making after one read retweet messages in Twitter. As the result of the factor analyses, we grouped the 28 question items into three categories: 1) Desire to spread the retweet messages as it is considered important, 2) Mark the retweet messages as favorite using Twitter "Favorite" function, and 3) Search for further information about the content of the retweet messages.

Keywords: retweet, emergency, social media, decision making, Twitter

1 Introduction

The social media allow people to interact freely, engaging in a conversation and build relationship using words, audio, pictures and videos. With social media, everybody can involve in reporting news, and therefore the ideas of "citizen reporter" occur where several events discovered by social media users. Compared to Facebook, 63.9% of the respondents in a survey by MMD laboratory [1] state that Twitter help them gather information about the disaster. There are several motivations on why user tend to depend on social media during emergencies, such as convenience, technology and ability barrier, prior experience, quality of the information, mass sending ability, and time and cost effective [2, 3].

Although there were many research about the potential of social media role and usage in emergency domain have been reported, few of them focused on how to combat misinformation transmission in social media. Previous research highlighted the need to study on people behavior after one read the crisis information and how people share information in social media [4]. Previous studies reveal the relationship between ambiguity, importance, anxiety, distance, feelings (valence and arousal) with information sharing behavior in disaster [4, 5, 6, 7, 8, 9].

There are four phases of the emergency management process: mitigation, preparedness, response and recovery. The use of social media is crucial in between preparedness and response phases where understanding on the information available and how to utilize it was seen as enormously important in emergency. Citizen supplying information to online system, such as by uploading disaster photos or updating information on affected people is crucially helpful in response phase [10]. Accordingly, our motivation study is towards the reducing of misinformation spreading at response phases, focusing on the public who may or may not directly affected in a disaster on spreading disaster-related information so that actions can be taken immediately to help reducing the disaster impact. Therefore, we conduct a survey to investigate what is the user's action after they read the retweet messages. The findings of this paper present the preliminary study on user`s decision making towards spread message in general. In the future, we plan to investigate further focusing on information spreading in emergency situation.

The rest of the paper is organized as follows. In section 2, we explain the social media issues within the emergency domain. Next in section 3, we discuss the research method. We elaborate our results and the discussion of findings in section 4. Finally, in section 5, we conclude our work and future work.

2 Background of the Study

2.1 The Social Media Issues in Emergency

In recent years, several studies have focused on the potential use of social media sites for mass collaboration in emergency response and rescue during emergency situation [2, 11, 12, 13]. There have been several studies in the literature reporting the effectiveness of social media in providing information about the disaster such as during The Great East Japan Earthquake [3, 14, 15], The Hurricane Sandy [12, 16], The Australian country fire authority [17], and plane crash in Hudson River [18]. Disaster communication, as part of emergency management indicates three essential elements needed when dealing with real incidents, which are speed, rhythm and trust [19]. During disaster, when formal channel such as television and newspaper did not provide enough information, information from

"citizen reporter" fill the information seeking gap [13]. Author [14] noted that the centrality of mass media increase as the ambiguity in social environment increases. Previous studies highlighted trusted information as one of the greatest problems with social media use during emergencies [2, 3, 6, 11, 13, 16]. Furthermore, other studies in the literature indicate the potential of social media on misinformation and rumor transmission that can create panic situation in emergencies [4, 7, 12, 13]. Misinformation can create panic situation during disaster, as people are strongly rely on social media as one of the most reliable information channel in disaster [7, 13, 15].

2.2 The Transmission of Misinformation in Twitter during Emergencies

Recently, Twitter has more than 230 million of active users monthly with 500 million tweets are sent per day [20]. Retweet is a way which users can be in a conversation and act as the building blocks for information sharing with potentially providing larger audience [21, 22]. Research by Gupta et al. [12] discovered that 86% of tweets with fake images URLs were retweets during 2012 Hurricane Sandy. The presence of URL increased the intention to spread the tweets although the URL did not have correct hyperlink function [8, 23]. In a different study, [24] gave a summary review on numbers of favorite and retweet numbers of false rumors spread in Twitter after the 2011 Japan earthquake. Based on the numerical analysis from the data collected, several misleading information spread after the disaster got high retweet number by users.

Research in rumor transmission started since WWII where in wartime, rumor transmission tend to happen when individuals distrust the news they heard [9]. The reason people transmit rumors is motivated by three psychological motivations which are: fact finding, relationship enhancement and self enhancement [25]. If false information is widely transmitted, it may cause people to change their belief and opinion [4]. Several action has been taken to reduce misinformation from spreading such as "rumor control" section on FEMA website (http://www.fema.gov), Twitter account (@IsTwitWrong) to criticize fake images spread by retweet, and official authorities account on Twitter to engage with citizen through social media channel during disaster [12,15]. Thus, with the concern to examine why people make decision to retweet, we first investigate what is the user`s action and state of mind after they read retweet message. Accordingly, we conduct a survey and report our findings in the next section.

3 The Questionnaire Design and Demographic Information

The questionnaire designed in Japanese language with 48 question items. The questions are divided into three parts with 7-likert scale answer. Likert scale is

usually used in questionnaire to obtain respondents degree of agreement with a statement [26]. The first part related to the questions of whether one sees retweet messages or not. The second part related to the questions of user's possible actions other than retweet. Meanwhile, the third part of the question related to the questions of whether one performs retweet or not, after they read the retweet messages. Figure 1 illustrates the scope of the questionnaire design in this study. The tweet posted by user A has been retweet by user B. Then, user C who read the retweet message from user B might take an action towards the spread message to their followers, and the information circulated. In this survey, our focus is to investigate user C decision making after they read the retweet message.

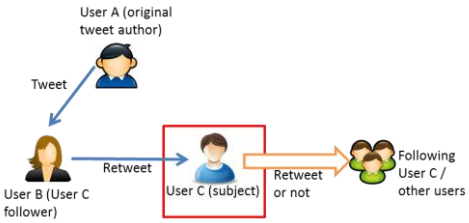

Fig. 1. The questionnaire design

The survey was held on 10 and 11 December, 2012. Total of 133 students who are Twitter user (mean age = 20.5, male = 94) from Iwate Prefectural University, Japan participated in the paper based survey.

For the analysis part, we perform Exploratory Factor Analysis (EFA) with maximum likelihood method. Factor analysis is used for data reduction and to group a large set of intercorrelated variables together under a small set of underlying variables. We eliminate the question items that have problems with floor effect (4 items), Cronbach alpha value (3 items), and questions that are not indicate positive actions user shall take towards retweet messages (13 items). Therefore, out of 48, only 28 question items remain for the analyses. Then, we perform Confirmatory Factor Analysis (CFA) with Structural Equation Modeling (SEM) to specify the relationship between variables and factors.

3 Results and Findings

4.1 The Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA) result

We analyze 28 question items which related to user's positive action taken towards retweet message. The result of the factor analysis found that 3 factors derived. The three factors were explained by 52.415% (Cumulative) as a total. To

confirm the reliability of measurement, Cronbach's coefficient alpha of each subscale factor 1, factor 2 and factor 3 are .930, .862, and .787 respectively. For the reliability test, the value of .70 and above is acceptable in most of the social science research situation. Table 1 shows the factor loadings for each factor.

We identified the following factors as the factors related to user's decision making towards retweet messages:

Factor 1: Desire to spread the retweet messages as it is considered important: This factor consists of 21 items regarding user willingness to take action towards the retweet messages by forwarding it, if they think the retweet message is important to be spread. The message could be positive, negative matter, call for action, "Pls RT" messages or the presence of URL link.

Factor 2: Mark the retweet messages as favorite using Twitter "Favorite" function: This factor consists of 3 items related to user's decision to use the Twitter favorite function (star symbol) to mark the retweet messages as favorite.

Factor 3: Search for further information about the content of the retweet messages: This factor consists of 4 items related to user's action to make further search if their interest sprung on the message content or about the tweet author.

To enhance the reliability of EFA result, we performed CFA to confirm the initial model of EFA provides a good fit to the data. Structural Equation Modeling (SEM) is a confirmatory technique used to validate a model. SEM describes the relationship between a set of observed dependent variables (factor indicators) and a set of continuous latent variables (factors) with 3 highest variable loadings for each factor (Figure 2).

Table 1. The Factor Pattern Matrix

Question item	Factor 1	Factor 2	Factor 3
40	.853	-.287	.005
35	.797	-.042	-.012
28	.770	.048	-.021
38	.695	-.206	.139
31	.687	.085	-.003
26	.661	.124	.002
27	.658	.081	-.074
42	.645	-.034	.127
41	.633	-.077	-.032
9	.613	-.137	-.016
32	.581	.245	-.131
30	.576	.117	-.185
36	.565	-.157	.094
16	.563	.153	.014
34	.547	.082	-.022
5	.460	.146	-.009
17	.442	.299	-.007
20	.426	.215	.223
29	.423	.106	.273
24	.414	-.024	.128
8	.382	.049	.023
13	-.067	.940	.020
14	-.195	.861	.039
15	.032	.739	.056
18	-.081	-.067	1.054
19	-.050	.104	.825
12	.123	.129	.368
7	.152	.134	.276
Cumulative%	37.882	45.792	52.415
Cronbach's coefficient alpha	0.930	0.862	0.787

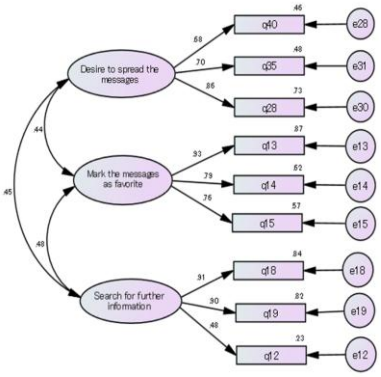

Fig. 2. The SEM diagram

We got the values as follows: Goodness of Fit Index (GFI) = .950, Comparative Fit Index (CFI) = .981, RMSEA = .057, AIC = 76.236. For GFI and CFI, the value of .95 and above indicates good model fit of the data [27]. Meanwhile, for the Badness of Fit, the RMSEA value less than .05 indicate close fit model. The lower value of AIC reflects better fitting model for model comparison. Hence, based on the result obtained, our model is a good fit model of the data.

4.2 Discussion and Future Work

In case of disaster, people often retweet and spread tweets they find in twitter trending topics, regardless of whether they follow the user or not [11]. We present our findings on one action towards spread message and as a result, we extracted 3 factors indicate user`s decision making towards retweet message: 1) Desire to spread the retweet messages as it is considered important, 2) Mark the retweet messages as favorite using Twitter "Favorite" function, and 3) Search for further information about the content of the retweet messages. Most users tend to spread any messages that they think is important for others to know. However, not all information is accurate during disaster. Individuals were more likely to spread crisis information when they have negative feelings such as scared, worried, anxious, angry or nervous [4]. The present finding also support Tanaka et al. [7] study which concluded that regardless of the tweet type, the more important user evaluate the tweet, the higher they intend to transmit the messages. This paper present our preliminary study findings on user`s decision making towards spread message in general. Although all subjects in the survey are Twitter users, some of them might not experience the real disaster situation. Therefore, the for the future work, we plan to improve the questionnaire focusing on emergency related situation and conduct a user survey with greater number of subjects for various groups.

5 Conclusion

In this paper, we raised our concern on misinformation spreading issue using social media in emergencies by investigating user`s decision making towards retweet message. We conduct a survey in Japan to investigate what action user will take towards retweet messages. The following points emerged from the present investigation: 1) Users tend to spread the retweet messages they saw, regardless it is any kind of message; positive, negative, jokes, or call for action, if they think it is important for others to know, 2) User's retweet behavior in emergencies might be different from the normal situation because in emergency where information is critical, user might transmit misinformation to make sense of their uncertainty.

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