

Study on Online Communication Emerged from Centralized Conference

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Abstract—A hashtag of Twitter was announced in a discourse of a centralized conference for in-service educators. Emerged online communication was analyzed by using social graph theory. In addition, online survey of educators who tweeted with a hashtag was executed to identify feasible approach to reach conference effects to local educators. As result, the author identified nine bridge influencers and eight hub influencers. These instructions give you basic guidelines for preparing camera-ready papers.

Index Terms—social graph, in-service training, centralized training, twitter

I. INTRODUCTION

In recent years, public school system in Thailand was re-structured under local government. The de-centralization is active, but the Ministry of Education still offers the centralized in-service trainings. These trainings gathered large number of participants, nevertheless trainings could not involve all educators in the country. Then, participated educators need to forward contents to colleagues in schools which they work. Although, the extending effects to rural areas have been unclear. Then, it must have a concrete way to know how the value of their experience reach out to others.

The use of Social Network System (SNS) as a powerful tool of our daily communication. More importantly, it seems to have become a relevant part of our daily communication, especially communication between people in different areas. Therefore, the study in this article tried to view online communication to disseminate information of a centralized training.

The study cooperated with Thailand Cyber University project (hereinafter TCU), the Commission on Higher Education, Ministry of Education, Thailand. TCU implements a centralized annual conference on a large scale for educators from elementary to higher education. This conference involves various educators in one place and is intended to provide novel information in terms of ICT education and e-Learning.

To use this opportunity, author set a hashtag of Twitter and announced it in a discourse, and collected data of emerged online communication. Because, microblogging such as Twitter is proving extremely useful for the fast

exchanges of thoughts, ideas and information sharing, where regular weblogs, such as Facebook are mainly used for writing short essays, knowledge saving and discourse [1]. Also, Twitter is recognized as beneficial for newcomers to become engaged with the educators community [2].

Also, participants of TCU conference are educators in the fields of ICT education, it seems possible to introduce communication of Twitter without any difficulty of ICT skills.

While Twitter has been studied from many perspectives, research on Twitter in the context of academic conference is rather rare [3]. In addition, there is no report of social graph in terms of a large scale ‘in-service training’, and then this study tried the first challenge to know a deeper insight on how Twitter can be used to enhance online communication and to connect educators in different areas.

II. GRAPH

In this study, social graph theory and method are widely used to analyze data. This social graph draws the personal relations of online users as a style of graph (see Fig. 1).

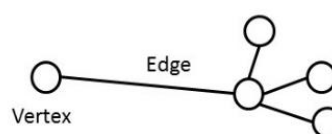


Figure 1. Graph.

The ‘graph’ in this context is made up of ‘vertices’ and ‘edges’ that connect them. As conceptual structure, the vertex usually means a person, and the edge usually means a message sent to a clear target person. The natural graph involves hubs of vertices with many edges, bridges of edges that connect two separate groups, and clusters that are groups of vertices. These characteristics are identical in the following Scale Free Network.

A. Scale Free Network

The graph of Gaussian distribution shows a bell-shaped curve and the most scientific studies in education followed this basis so far. However, Barabási *et al.* [4] found social activities of human followed Power Law. Then, this Power Law distribution has more data with extreme value that means existence of hubs than

Gaussian distribution, and is called as a Scale Free Network.

B. Small World Phenomenon

Milgram [5] reported that the people who may be very far apart physically and socially are still connected with relatively small paths, and he showed evidence of the phenomenon by investigation, and called this phenomenon as ‘six degrees of separation.’ Thus, many vertices in a social graph are connected with small distance one another under small world phenomenon.

III. METHOD

The 5th International E-Learning Conference (IEC2014) organized by TCU was held on August 5-6, 2014 in Bangkok. The author selected one of preliminary discourse of 40 minutes in the conference to introduce online communication. Here, a hashtag of Twitter was designated and announced via all visual presentation slides.

Mitchell [6] designed own presentation to examine Twitter by setting up a specific hashtag and to make Twitter communication ran in the backchannel. Online communication was showed in monitors in the conference. Then, the author installed an additional screen for Twitter in the discourse room to promote live online communication to participants.

A. Twitter

On Twitter, some functional messages are allowed. ‘Replies to’ are messages that a user replies specific Tweet to a specific user. ‘Mentions’ that contains an account of someone in Tweet message. ‘Retweets’ are messages start with RT and forwarding original Tweet. In addition, we can have ‘followers’, some accounts select our accounts and collect our Tweets automatically on their home tab. The # symbol in a Tweet, is called as a hashtag, is used to mark keywords or topics.

The author collected Tweets data available over the Twitter Application Programming Interface (API) by searching the corresponding conference hashtag.

B. Analysis of Social Graph

The NodeXL, an extendible toolkit for community exploration implement, an add-in to the Microsoft Excel was used for download data from API, visualizing social graphs and calculating graph metrics.

C. Participants

In the target discourse, there were 93 participants in a room.

IV. RESULTS

The data of Twitter communication with a hashtag were collected from API. From 93 participants in a room, totally 23 distinct vertices and 62 edges appeared. This means that around 25% of participants in a room joined Twitter communication, and Tweet rate was 2.7 Tweets/vertex. Wen et.al. [ibid.: 3] reported higher Tweet rate 4-8 Tweets/vertex in conferences. Fig. 2 shows social

graph of online communication, and vertex of a hashtag organizer was located in the middle. It could find that this graph at the dawn of online communication did not having reached maturity of the scale free network.

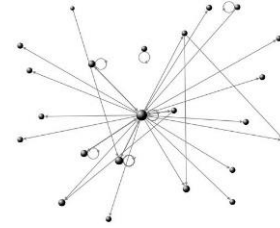


Figure 2. Social Graph of hashtag Tweets with vertex size proportional to vertex in-degree statistics (Harel-Koren Fast Multiscale Algorithm [7]).

V. DISCUSSION

To infer future possibility to disseminate online communication among participants, the author made two ways of extensional survey of participants who tweeted with a hashtag excluding vertex of a hashtag organizer, that is, A to merge their all ‘replies to’, ‘mentions’ and ‘retweets’, and B to merge their all ‘replies to’, ‘mentions’, ‘retweets’ and ‘follows’ (see Fig. 3).

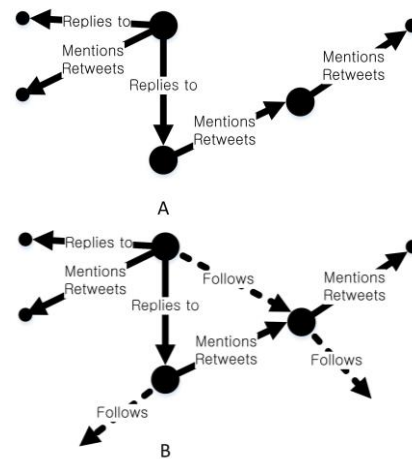


Figure 3. Macrostructure of a directed graph in extensional survey of participants who tweeted with a hashtag.

TABLE I: COMPARISON OF METRIX

Metrics	Hashtags	A: RP + MN+RT	B: RP + MN +RT+FL
Vertices	23	792	10772
Unique Edges	26	590	13274
Total Edges	62	2466	15627
Maximum Vertices in a Connected Component	22	427	10772

RP: Replies to
MN: Mentions
RT: Retweets
FL: Follows

Table I shows present online deployment of communication of participants who tweeted a hashtag. A includes vigorous online activities to tweet, and B involved additional edges of automated Tweets forwarding to followers.

A. Potential of Bridge Influencers

An extensional survey A inquired potential activity of participants who tweeted with a hashtag.

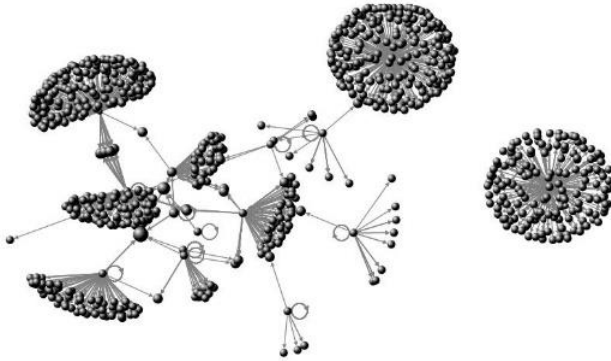


Figure 4. Social Graph of hashtag participants and their 'replies to', 'mentions' and 'retweets' with vertex size proportional to vertex in-degree statistics (Harel-Koren Fast Multiscale Algorithm).

Fig. 4 shows a social graph of them. Related vertices increased drastically to 792, and some hubs are appeared. It could find that some vertices behaved as users of high activity. In fact, nine vertices had more than 10 out-degree within observed 792 vertices. Then, there is a possibility those vertices can become bridge influencers to connect with other online communities.

B. Potential to Access a Hub of Another Community

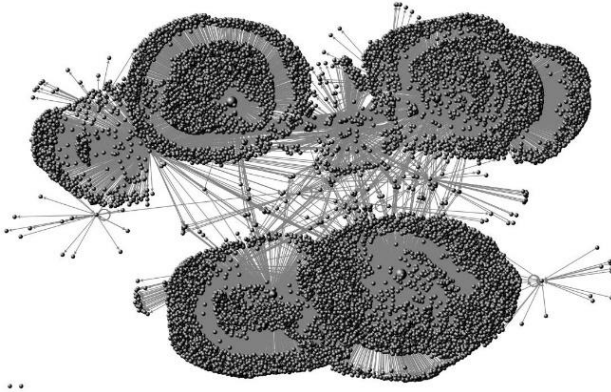


Figure 5. Social Graph of hashtag participants and their 'replies to', 'mentions', 'retweets' and 'follows' with vertex size proportional to vertex in-degree statistics (Harel-Koren Fast Multiscale Algorithm).

The social graph of survey B includes data of automated Tweet forwarding to their followers (see Fig. 5). This social graph implies the possibility to make ties with more than 10,000 people when vertices with a hashtag post interesting Tweets to their followers or following accounts. Here, there were 13 vertices within 10,772 had more than 10 in-degree, and 8 within above 13 had more than 100 followers. The scale free network is appeared and the graph imply our future approach to select vertices with many followers to disseminate information of a centralized training. Maximum geometric distance was 6, and average geodesic distance was 3.95.

Table II shows comparison of metrics between collected online communication through this investigation and an extensional survey. Wen et al. [ibid.:

3] proposed the conversion rate (CR) as $CR=A/C$ where (C) means contribution by counting the number of Tweets and (A) means attention by identifying the edges where vertices were 'mentions', 'replied to', or 'retweets'.

TABLE II: COMPARISON OF METRIX

Categories	Hashtags	Extensional
Vertices	23	10772
Total Edges	62	15627
a) RP	27	142
b) MN	1	317
c) RT	2	1035
d) Isolated Tweets	23	957
e) FL	9	13176

RP: Replies to
MN: Mentions
RT: Retweets
FL: Follows

In this study, CR in social graph of hashtags group is 0.56, and CR in social graph of extensional group is 0.61. These are satisfactory decent conversion rates comparing with preceding study (0.40-0.77), and the possibility to enhance online communication in next tryout has been raised.

C. Independence of Hubs

Surprisingly, social graph with filtered vertices with more than 10 out-degree had limited ties between vertices (see Fig. 6, notice: edges to a hashtag organizer were excluded).

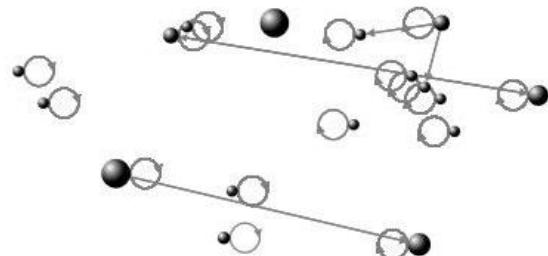


Figure 6. Filtered Social Graph of RP+MN+FL with vertex size proportional to vertex out-degree statics.

In the preceding study, Sopan et al. [8] reported the occasion of a conference expands participants' follower-network as significant growth. Also, in this study, 9 new followers appeared in 23 vertices and this effect should be noteworthy strategy to bridge different groups of people in the next study.

VI. CONCLUSION

This study with analyzing Twitter communication showed potential to enhance online communication by making ties to users of higher activity. Social graph analysis provided identification of influential participants. Filtering view by their out-degree in which participants of higher activity in Twitter shows limited inter-relationship. These findings lead suggestions to the next tryout that approaches to influential educators to enhance dissemination of conference information should be taken.

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