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<https://hdl.handle.net/2324/1498348>

出版情報 : The First Asian Conference on Information Systems : ACIS 2012, pp.1-6, 2012-12
バージョン :
権利関係 :

Generation of Hen-ai Map from Search Log for Foreign Language Learning

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Abstract Practical environment is crucial in improving foreign language learning. At least, it requires a conversation partner and the subject of conversation. Common interests will be the best subject to start talking. This paper proposes a method to generate a "Hen-ai Map" from search logs in SNS to help finding common interests with the conversation partner. "Hen-ai Map" is a kind of mind map which displays his/her favorite objects.

Keywords : SNS , mind map, text mining, learning environment

1. INTRODUCTION

Listening, speaking, reading and writing are the four key skills required to learn foreign language. Listening and talking are particularly important in improving communication skills. It used to be hard to find a native speaker to talk. Thanks to the development of internet, people can be a partner as long as they are connected with camera and phone. We can use Skype, for example, to talk to a native speaker. There are several commercial service (LangRich) which provides an environment and a native speaker as conversation partner. Yin et al. (2009) proposed a system which searches for appropriate person who can help foreign language learning. They use the human relations in SNS. A conversation partner is important in improving communication skills in foreign language learning.

The first author has been using LangRich and has been practicing his conversation with native speakers. However, he faces a difficulty to find an appropriate subject to keep communication, after a simple and typical self introduction. This is not a problem only for him or only for foreign language. It is a problem in communication with unknown people. Particularly, when the conversation partner has a different cultural background, it is much more difficult to find a common subject to talk.

This paper proposes to use "Hen-ai map" as a tool to activate communication in foreign language learning. Hen-ai map is a kind of mind map on which keywords are displayed related to his/her interests. Saito (Saito,2004) introduced Hen-ai map as a communication tool. The map is useful to expose yourself and to be understood by a conversation partner. Each party can ask or explain keywords that are displayed on the map. Chances are high that they find common interests. Those keywords can be a good start point to start or to continue conversation.

Hen-ai map is a mind map applied to display the user's interests. There are several softwares to create mind maps (iMindMap). It is interesting but time consuming work to create original mind map of our own. Completely different

mind maps would be created even if they are started from the same initial keyword. On the other hand, there are several systems to generate keyword maps automatically from some sets of documents (Ohsawa,1998;Shimoji,2008).

The Hen-ai map should be different to each other depending on the person who created the map. The map should reflect the taste of the person. If a mind map system is used to create a Hen-ai map, interaction with the user is necessary to get the user's liking. Questionnaire would be an idea to obtain the response from the user to generate a Hen-ai map. However, someone has to design and prepare the questionnaire. Moreover, when we want another Hen-ai map focused on a particular theme, we need another questionnaire again. After all, the Hen-ai map generation system should be reflexive to take out various interests of user efficiently.

This paper proposes a system which generates Hen-ai map of a user from search logs. We also propose a Hen-ai map sharing system by combining SNS and search engine. The two systems will be a solution to the problem of finding a conversation partner and to the problem of finding a subject of the conversation, in foreign language learning.

2. RELATED WORK

Hanai map can be considering as a kind of Mindtool. Mindtools are computer-based learning applications which serve as extensions of the mind (Jonassen, 1998). Jonassen described Mindtools as "a way of using a computer application program to engage learners in constructive, higher-order, critical thinking about the subjects they are studying". Mindtools include databases, spreadsheets, concept maps, computer conferencing, simulation programs, and communication facilities such as online discussion forums and search engines (Wu et al., 2010).

Many researcher employed Mindtools to enhance learning. For example, 1) Hwang et al. (2012) indicated that using the Mindtool can help students organize and share knowledge for differentiating a set of learning targets based

on what they have observed in the field. 2) Hung et al. (2012) developed a concept map (a kind of Mindtool) integrated mobile learning design for ecology observation and to examine the implementation effect for elementary school children. 3) Nuutinen et al. (2010) proposed a social mindtool, which can be used in collaborative learning situations. They defined the requirements of social mindtools as awareness of other participants, communication and the ability to edit common objects together.

Our system can be regarded as a Mindtool in the sense that it is a kind of mind map, and it provide a concept map to learners, which could support higher level thinking for advanced learners. Our system is used to demonstrate how learners can model what they know, and build model, externalize learners' conceptions.

In Wu et. al. (2011), the authors developed a search engine of journal articles that uses search logs to share experience. Figure 1 shows the interface of the system. Frame A lists the articles obtained as search results together with the star marks that shows the number of user who selected the paper among the search result and with the circle mark that displays the related articles in access log. Frame B displays the related articles found with each paper in access log. The system that we are going to make replace this area by a Hen-ai map as Figure 4.

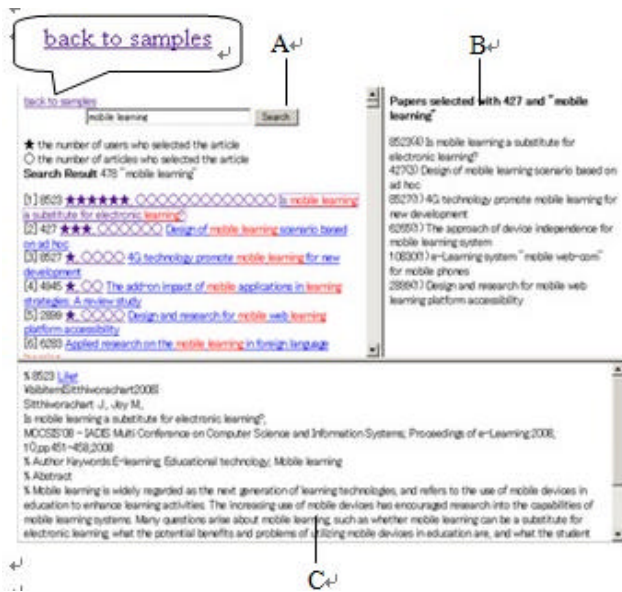


Figure. 1 Search Engine with Community Search Logs

3. DEVELOPMENT STAGES

We are developing a system of Hen-ai map which shows interests and characteristics of a user. The system is expected to be used for long term. The map itself will grow through the interaction with the user. Editing function is necessary to improve the interaction. Isolation of a user from other users does not make a good communication environment. Sharing of maps in a community will be effective to activate the communication. So, we want to connect our system with SNS.

We will realize the system in the following 3 stages.

STAGE 1

We use the documents from Yahoo Chiebukuro[Yahoo] to construct a search engine which displays the search results as a Hen-ai map. Yahoo Chiebukuro is a database of Q&A's. A user can ask a question to which other users can respond. The response is evaluated by the questioner. At the first stage, we select around 10,000 articles in the category of entertainment and hobby. We add a personal editing function on the search engine by which a user can arrange the map as he/she likes. The map should be used to grasp favorite deviation visually. We expect that tastes and interests will be guessed from what they chose. We consider that the category of entertainment and hobby is best to extract users' intuition.

STATE 2

We extend the system to cover all documents of Yahoo Chiebukuro. We will improve the display of Hen-ai map and editing function.

STAGE 3

We plan to realize the function of history, clustering and ranking of users' search log. We connect the system with SNS where users can share their Hen-ai map with each other.

4. HEN-AI MAP GENERATION PROCESS

The figures 2 - 5 shows how an Hen-ai map will be created from the access log of documents in the category of entertainment and hobby of Yahoo Chiebukuro.



Figure 2. Search Interface

The system learns user's interests and favorites from how and what they search and from how they responded to the search results. Figure 2 shows a standard process how we use a search engine. A user starts searching by entering a

keyword or choosing a sub-category. A list of search results will be shown from which the user can select appropriate notes of Q&A. The process can be continued as you like.

Data construction + Information processing

- ・東野圭吾 秘密 (Entertainment and Interest > Books > reading)
- ・くりいむしちゅー 上田 (Entertainment and Interest > Entertainer > Comedian)
- ・松本人志 すべらない話 (Entertainment and Interest > TV, Radio > Variety and Comedy)
- ・キングダム (Entertainment and Interest > Anime, Comics > Anime)
- ・おやすみブンパン (Entertainment and Interest > Anime, Comics > Comics)
- ・ワンピース エース (Entertainment and Interest > Anime, Comics > Comics)
- ・bump of chicken 太陽 (Entertainment and Interest > Music > Japanese music)
- ・鋼の錬金術師 (Entertainment and Interest > Anime, Comics > Comics)
- ・はじめの一歩 (Entertainment and Interest > Anime, Comics > Comics)
- ・星新一 (Entertainment and Interest > Books > reading)
- ・東野圭吾 分身 (Entertainment and Interest > Books > reading)
- ・くりいむしちゅー 有田 (Entertainment and Interest > Entertainer)
- ・GReeeeN (Entertainment and Interest > Music > Japanese music)
-

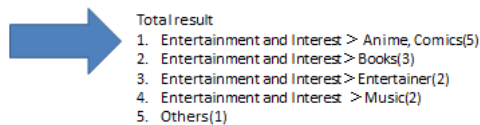


Figure 3. Access Log Sample

Q&A's are classified into several categories as shown Figure 3. The access log data contains those categories as well as date, time, IP address and url. A simple processing of access log, we can analyze the distribution of the user's access with respect to categories. In this example, the user checked "animation and comics", "book and magazine", "entertainers", "music" and "TV and radio" in the "entertainment and hobby" category. The categories can be ranked according to his/her access count. The top 4 categories are shown in detail. The rests are summarized as one category of others.

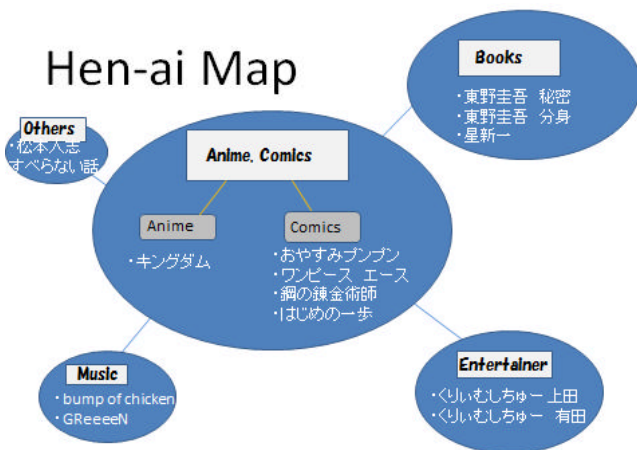


Figure 4. Hen-ai Map Sample

Figure 4 shows an example of Hen-ai map generated from Figure 3 of search results. The top ranked category is displayed in the middle of the screen. The second, third and fourth are shown in clock-wise order around the top category. The names of sub-categories are shown in the circle of a category as a tree, where the title of the category is shown at the root of the tree. The keywords by the user are shown at

the bottom of the tree.

A user can edit the contents of nodes of the Hen-ai map by adding, deleting and changing the titles and the keywords. Figure 5 is obtained by changing the title of the top category from "anime and comics" to "manga". The user considered the word "manga" is better to represent the detailed contents of the node. The sub-trees of "anime" and "comics" are merged in one category. The title of the second category "book and magazine" is changed by "Keigo Higashino", a popular Japanese writer of novels. The title of the third category "entertainer" is changed by "cream stew", a popular comedy duo. Professor Saito, the inventor of Hen-ai map, recommends to use actual words instead of general and conceptual words [Saito,2004]. The automatic extraction of these words is known to be a difficult task. We prefer the interaction with user to get appropriate keywords.

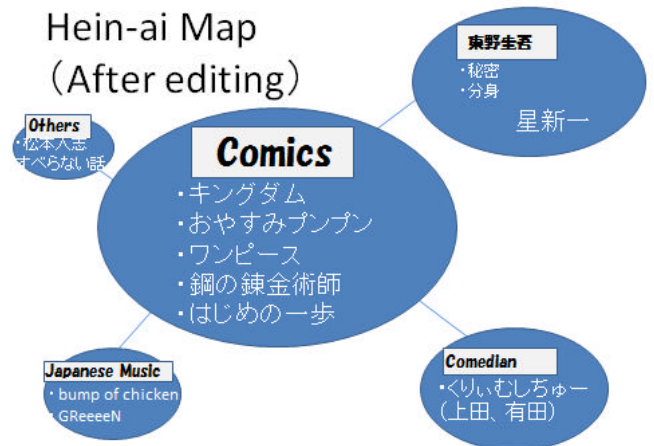


Figure 5. Modified Hen-ai Map

6. FEATURE OF SYSTEM

We chose 10,000 articles in Q&A's of Yahoo Chiebukuro as a basic data to construct Hen-ai map. The category structure is essential in generation a Hen-ai map. A Hen-ai map is generated automatically from access log.

The personalized use of access log is another feature of the proposed system. The articles are displayed as nodes of categories. The position and the size of the nodes shows the ranking of the searched articles. Top ranked category, that is the main interest of the user, is shown at the middle of the screen. The nodes contain the title and sub-structure of the category. The user can edit the contents of nodes to change the map more realistic. Irrelevant contents can be erased.

The Hen-ai map is generated automatically from the access log of the user. But, the interactive modification of the titles, the sub-structures and the keywords in the Hen-ai map is crucial to make the map for his/her own. General and conceptual words obtained automatically would loose the essence of Hen-ai map that should be interpreted by intuition. The words in the map should be solid and actual.

6. CONCLUSION AND FURTHER WORK

In this paper, we proposed a learning support system which generates Hen-ai map of a user from the search logs for English conversation. A user can find the subjects to talk and can show his/her interests. The Hen-ai map is useful to be understood who you are and what you like. The map is useful to find a common interest that should be an ice-break of the conversation. The Hen-ai map will improve the communication in foreign language learning.

We focused on foreign language learning environment in the present paper. However, the Hen-ai map is a general tool of communication. As the inventor says that the tool has an infinite possibility to be used in any circumstances of communication. Tight connection or complete embedding of Hen-ai map system with SNS will be our next big challenge. The system we are creating considers a single user. The map is generated for one user with his/her access log and modified by the user. The generation and modification of Hen-ai map with many people will be useful as a tool of Web communities. We think that we know well our friends in Facebook or mixi, because we see most of them at real life. But, it is often the case that we did not know interesting stories before we talk at some party. The visualization with Hen-ai map will be useful in many situation other than in foreign language learning. The system is being developed by Java and Perl. As future works, we are considering apply the system for SNS as the second scenario.

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