Mining the Behaviour of users in a Multilingual Information Access Task

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Abstract

This paper summarizes the participation of IIIT-H in the CLEF 2008 interactive task. Our goal was to mine the logs and extract conclusions about the behavior of users when facing a strictly multilingual information access task. We are provided the search logs which are generated by an online game, known-item image retrieval from Flickr. In this paper we describe the following tasks. We looked for the differences in the search behavior according to the language skills. We clustered the users based on the score of the user, precision of the user and the number of hints he asked for. We then studied the behavior of the most successful user cluster, the least successful (unsuccessful) user cluster and the users in between the above two. Our results show that, most of the users start with monolingual interface and soon they realize cross-lingual is interface is more useful than mono-lingual interface, and the users are more comfortable to search in their mother language or the languages that they know.

Categories and Subject Descriptors

H.3 [**Information Storage and Retrieval**]: H.3.1 Content Analysis and Indexing; H.3.3 Information Search and Retrieval

General Terms

Interactive information retrieval, cross-language information retrieval

Keywords

CLEF, iCLEF, Flickr, multilingual search, user behavior

1 Introduction

The CLEF [1] interactive track (iCLEF [2]) (the CLEF interactive track) has been devoted, since 2001, to the study of Cross-Language Retrieval from a user-centered perspective. The aim has always been to investigate real-life cross-language problems in a realistic scenario, and to obtain indications on how best to aid users in solving them. Multilingual information retrieval is particularly interesting from an interactive point of view, because the need for search assistance is substantially higher than in monolingual information retrieval: normally, the user can quickly adapt to the system's modus operandi, but not to an unknown target language. iCLEF2006 was concentrated on a realistic multilingual search. The main limitation of iCLEF2006 was that it was not possible to have a large-scale user logs through the above experiment.

iCLEF 2008 proposes a task, which consists of searching images in a naturally multilingual database, Flickr [3], which has millions of photographs shared by people all over the planet, tagged and described in a mixture of most languages spoken on earth. The concentration was on collecting a large-scale user logs, and let the participants mine those logs to gain knowledge about the user behavior when they need to search in unknown languages.

We used the search logs provided to us to know how the users behave when facing a multilingual information access task. Users. language skills are important in examining the cross-language search. If they are provided the cross-lingual interface, how do their language skills influence their search behavior?

2 Methodology

We followed the iCLEF guidelines which are briefly mentioned here.

Task definition

The task is known-item image retrieval based on photos from Flickr: the user is given an image, and the goal is to find the image again from Flickr. The user does not know in advance in which languages the image is annotated; therefore searching in multiple languages is essential to successfully find the images. The advantage of this kind of search task is that it has clear goals for the user, it has a clearly defined measure of success (the image is either found or not) and whilst searching for the required image, users will invoke different (and potentially interesting) search patterns.

Default MLIR front-end to Flickr

The participants are given multilingual information retrieval interface to Flickr with the following functionalities:

- Multilingual search: query in one language, get search results in up to six languages (English, Spanish, French, Italian, Dutch and German).
- Term-to-term translations between six languages (English, Spanish, German, French, Dutch and Italian) using freely available dictionaries (taken from http://xdxf.revdanica.com/down/).
- Selection of "best" target translations according to
  - Presence in the Flickr related terms for the query, which often include target-language terms because they co-occur with the query terms in images annotated in multiple languages, something which is not unusual in the Flickr database; and
  - String similarity between the source and target words. This was included because the free dictionaries used did not have information about the most frequent sense/translation.
- Enables user to pick/remove translations, and add their own translations. We did not provide back-translations to support this process, in order to study correlations between target language abilities (active, passive, none) and selection of translations.
- Control over the game-like features of the task: flow of images, users ranking, etc.
- Provision of search suggestions (Flickr related terms plus tags from displayed results)

Participation

Participants in iCLEF2008 can essentially do two tasks:

1. Search log analysis: participants will have access to the search logs, and can freely perform data mining studies on them. Initial examples are: looking for differences in search behavior according to language skills, or looking for correlations between search success and search strategies, etc.

2. Interactive experiments: participants can recruit their own users and conduct their own experiments with the interface. For instance, they can recruit a set of users with passive abilities and another with active abilities in certain languages and, besides studying the search logs, they can perform observational studies on how they search, conduct interviews, etc.

We selected the Search log analysis and mined the behavior of the users when facing a strictly multilingual information access task.

We clustered the users based on the parameters score no of hints and the precision. The users are given some weight which is calculated as $s * p/h + 1$.

Where

s is the score of the user

p is the precision of the user

h is the no of hints taken by the user

Based on the weight the users are clustered by using a threshold limit. We studied the behavior of the most successful users, the least successful (unsuccessful) users and the users in between these two.

We also looked for the differences in the search behavior of the users according to their language skills.

3 Results and Discussions

3.1 Behavior of User clusters

There are 307 users in total, in the search logs. For the user clusters built using the weight assigned to each user, we studied the behavior of the most successful users, the least successful users and the users in between the above two. The results are shown in Table 1.

41% of the successful users look at atmost the first two pages of search results. 30% of them did not ask for hints. The successful users reformulated the query frequently instead of going through many result pages. 65% the unsuccessful users searched for 1 image or less and 80% of them searched for 2 images or less. 45% of them looked at atleast three pages of search results. 34% of them asked for atleast one hint. The unsuccessful users rarely reformulated the query. Only if they do not find the image after going through many result pages, they reformulate the query.

On an average all the users (in the search log) reformulated the query around 9 times per image, looked at around 8 result pages per image and they asked around 1 hint per image.

3.2 Differences in search behavior according to language skills

Language skills are important in examining the cross-language search. Except for a small number of users, almost all the users preferred to search in their mother language or active languages. They did not prefer unknown languages while searching. A few users used passive languages in cross-language interface. The users asked for more number of hints while searching in languages other than their mother language. They reformulated the query very frequently while searching in their mother language as opposed to searching in other languages. Many users seemed to assume they could find everything in their interface language (mainly mother language). After searching for sometime they came to know that this was not the case here.

Majority of the users are native speakers of Spanish with Italian and English in the second and third positions respectively.

Our results indicated that users predominantly search in their native language, using other languages (unknown/passive) relatively infrequently. The users behaved closer to native language ability when using an active language as opposed to one that was unknown.

Users	Average number of Reformulations per image	Average number of results pages visited per image	Average number of hints taken per image
Most successful users	12.22	6.12	0.49
Users in between successful and unsuccessful users	10.2	7.87	1.21
Least successful(unsuccessful) Users	7.52	13.27	1.86
All the users(in the search log)	9.23	7.72	1.27

Table 1: Table 1. Behavior of the most successful users, the least successful (unsuccessful) users, the users in between the above two and the average behavior of all the users in the search log.

3.3 User Questionnaires

The search log contains the information about the questionnaire which was shown to the user after he found or gave up the image. If the user gave up an image, one of the main reasons was there were too many images for the user.s search. The other main reason was that the user could not find suitable keywords for that image. If the user found an image successfully, one of the main points he filled in the questionnaire was it was easy to find that image.

In 'give up' questionnaire 66% of the users said that there were too many images for their search, so they could not find the image. 20% of the users gave up an image because they could not find suitable keywords for the image.

In 'found image' questionnaire 75% of the users said that it was easy to find an image.

3.4 Observations

- Users feel more confident when searching in the languages they know.
- 18% of the users have the precision value '1' and 18% of the users have precision value '0'.
- On an average the users found more images using monolingual interface.
- Most of the users start with monolingual interface and soon they realize cross-lingual is interface is more useful than mono-lingual interface.

4 Conclusions

In this paper, we presented the participation of IIIT-H in the interactive CLEF 2008 task. Our goal was to mine the logs and extract conclusions about the behavior of users when facing a strictly multilingual information access task. We are provided the search logs which are generated by an online game, known-item image retrieval from Flickr.

Our results show that, most of the users start with monolingual interface and soon they realize cross-lingual is interface is more useful than mono-lingual interface, and the users are more comfortable to search in their mother language or the languages that they know.

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