Catching the User - Logging the Information Retrieval Dialogue

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ABSTRACT

This position paper supports the idea of the information dialog between IR systems and users during an information search task. In order to satisfy the communication and interaction needs of humans, IR systems should explicitly support the cognitive abilities of the users. An information dialogue which does not only support an individual query but also the complete search process is necessary. Only in this way it is possible to satisfy an information need.

Categories and Subject Descriptors

H.3.3 [**Information Search and Retrieval**]: Search Process; H.3.7 [**Digital Libraries**]: User Issues

General Terms

information retrieval, visualization, interactive systems

1. INTRODUCTION

Information seeking is usually not a single step to recover a piece of information, but a cyclic, highly interactive process with the aim to satisfy a specific information need. Within such a process the user builds a cognitive model, which helps her to reflect and advance the search process.Within user interfaces, it is necessary to integrate tools and functionalities within existing tools, in order to develop this cognitive perception and derive a context model of the users. Requirements for this are logging of all user and system activities ranging from entered queries to the result sets, tools to visualize the context and system support based on a context analysis.

2. ASPECTS

In order to support the statement of the introduction, we would like to dwell on three aspects.

2.1 Logging

As stated above we need to log all user and system activities and the corresponding result sets within a task to catch the users context. From the experience one knows that a search task is usually not concluded with the first query. Rather a working context through the interaction is elaborated. When this understanding becomes clear, there must be some kind of accompanying information dialogue. A dialogue consists of a sequence of activities and results.

In the past initial research ([2] and [6]) focused on the human users not only as a part of the system but also as an important component. In later works it was recognized that the search is a process. In other papers (e.g. [1]) the search strategies and search patterns where investigated. The overall complexity of the search process was exposed ([11], [12],[17]). In [7] a continuation models of information dialogue was introduced, to cover this search process.

The process of the related research was consistent: Starting from the support and improvement of individual queries, up to a more global view of the search process and dialogue. But this global view must become granular again. In order to interpret a process or a dialog, the individual steps must be identified and formalized within this dialog.

[8] identified six activities – exploration, navigation, focus, inspection, evaluation and store – to focus on to derive a context model of the user.

1. Exploration: The access to set of information objects in the form of a query and the visualization and realisation of the produced result set defines the Exploration. A change respectively an enlargement of the informal context is caused by it.

2. Focus: The focus set represents the subset of information objects of a result set which reach the field of vision of the user through a visualisation and is the result of the activity Focus

3. Navigation: The movement within a set of information objects (information room) or between different information rooms. This causes a change of the focus.

4. Inspection: Inspection is used for the cognitive determination of the state of an information object.

5. Evaluation: Evaluation gives the system a feedback of the user's understanding of relevance and appoints the verified recall set.

6. Store: This activity allows to store found documents. It either happens logically in form of a storage box on

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the user interface or physically when a document is downloaded or printed.

Based on these definitions we can log a dialog or the whole search process with the system. Because some of these acitivities correlate we can identify three interactive modes. The user finds oneself in one of theses modes and will change cicular the mode. The first mode is every time *access*. Within this mode there is only one activity, EXPLORATION. Already after the first EXPLORATION the user changes into the second mode *Orientation*. Activities for this mode are NAVIGATION, FOCUS and INSPECTION. The user is now in the ability to change the visual as well as the informational focal point in an information visualisation of the dialogue context. The mode *Assessment* is reached, if the user finds objects of interest during his ispection. For this mode the activities EVALUATION and STORE are available. They help to express the users appreciation of relevance and to define the identified recall set.

Beside different models for information searching ([1], [13], [5]) it was [15] who combined these approaches in a new model. Based on idea we can enhance this model with our activities and interactive modes (see figure 1).

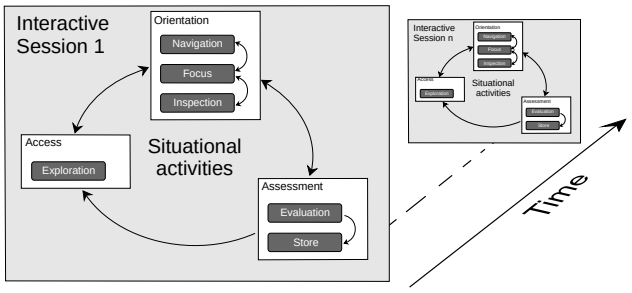

Figure 1: Enhanced model of Spink

2.2 Visualization

The past research ([14], [9]) showed that information visualization is an important concept for the cognitive support of the user. [3] said: "'Visual interfaces to IR systems exploit powerful human vision and spatial cognition to help humans mentally organize and electronically access and manage large, complex information spaces. The aim is to shift the user's mental load from slow reading to faster perceptual processes such as visual pattern recognition."'.

This statement leads us to the second aspect of our position. If we understand search as a process, whose progression fills our context, then we need also support, in order to understand and interpret this context. So the visualization of results must go beyond the usual measure. Especially the different sets of information objects shown in [7] seems to be useful to visualize (see figure 2). The user needs a portfolio of visualization tools which approach his cognitive abilities. Furthermore, the user must be able to get the full control of his search history and the developed information context. By logging all activities and the sets of information objects resulting from it, we are able to get a first formal overview of our context.

A first prototype is developed which visualize the different sets of information objects during an information search

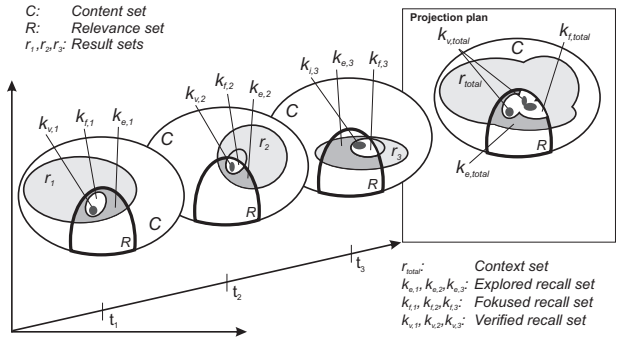

Figure 2: Sequence of Separate Queries

process (see figure 3). In a next step we will evaluate this prototype.

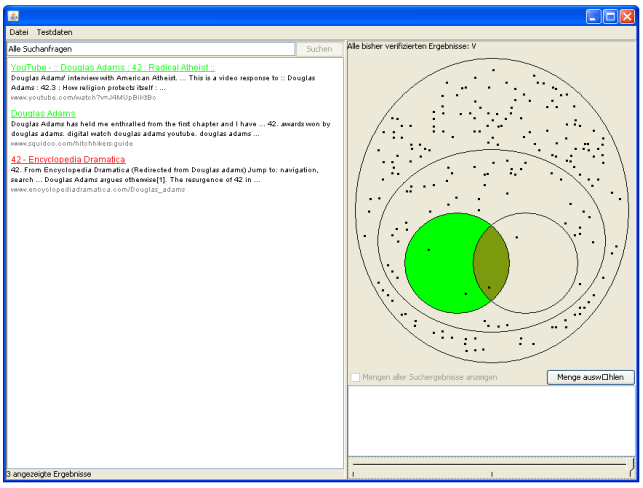

Figure 3: Screenshot of a prototype

2.3 System support

In order to support the user during the search task, systems should be proactive ([10], [16]). To be able to actually support and evaluate our model we need a system which meets the following demands. The system

- should fundamentally support the interaction model,
- should map the described activities to support the user,
- should enable the quantitative and qualitative evaluation of the model,
- and should be highly flexible and extensible to integrate new visualisation technics.

Following the formal description of the information dialogue and given the demands we want to introduce the Daffodil-system as an experimental system for further development and evaluation of the above described model. It provides already, up to a certain extend, the demand for mapping the user activities to existing available tools.

With the information of our context model including the search path we identifed the following challenges:

Relevance Feedback The users implicit and explicit relevance assessments must be captured and related to possible relevant documents.

Search strategy With the help of the user or by monitoring the activities the system must provide different search strategies to raise effciency.

Collaborative recommendations By logging many different searches in form of a set of activities, it is possible to support a user through collaborative recommendations. Analyzing a new search from the beginning, the system is able to identify similar stored search processes. If this knowledge is visualized for the user, he could get benefit for his own search task.

3. CONCLUSIONS

The idea of this position paper is to support users within a search task by logging all activities between the user and the system. For this, we are able to visualize the context and make it cognitive perceptible. Furthemore, we are able to draw conclusions from this activities. This captured information represents the basis to further understand and support the user. Such support could be done through recommendation via implicit relevance feedback as well as collaborative recommendations through other users in a similar situation. We think, that given the context model within the Daffodil-Framework, we are able to understand and categories user behavior and provide solid data to support system oriented IR evaluation, e.g. based on user simulation.

We currently investigate and evaluate our research using the Daffodil - framework ([4]) as an experimental system. In order to evaluate the listed aspects, we momentarily work on the following projects:

- Task manager: A tool to capture and log all activities and resulting sets of information objects of a search task over more then one session.
- Visualization: Visualize the context and search path with help of venn diagrams.
- Relevance feedback: Interpretation of activities as implicit relevance feedback with term suggestions and reranked result lists.

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