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Subjective Relevance: Implications on Digital Libraries for Experts and Novices

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Abstract. Traditional information retrieval (IR) systems are developed based on the “best match” principle which assumes that users can specify their needs in a query and documents retrieved are relevant to users. However, this objective measure of relevance is limited as it does not consider differences in experts’ and novices’ knowledge and context. This paper presents initial work towards addressing this limitation by investigating subjective relevance (that can include topical, pertinence, situational, and motivational relevance) features that can be incorporated into digital library interfaces to help experts and novices search and judge relevance more effectively. A pilot study was conducted to elicit initial subjective relevance features from experts and novices. The paper concludes with a discussion of elicited design features and their implications for user-centered digital libraries.

1 Introduction

Traditional IR systems are developed based on the “best match” principle assuming that users can specify their needs in a query [1]. Using this principle, the system retrieves documents “matching closely” to the query and regards these documents as relevant to the user. However, this objective measure of relevance is limited as it does not consider differences in experts’ and novices’ knowledge and context.

Experts and novices have different skills. Experts have experience with IR systems and domain knowledge that allow them to search and judge relevance more effectively than novices who do not possess such skills [2]. To address experts’ and novices’ needs, and limitations of objective measure of relevance, user-centered digital libraries can attempt to incorporate additional features such as support for subjective relevance in an attempt to further improve document retrieval to suit users’ needs and contexts.

This paper presents initial work towards user-centered digital libraries by investigating features prompting subjective relevance of documents that can be incorporated into digital library interfaces to address experts’ and novices’ needs.

2 Types of Subjective Relevance

Relevance is a relation between some entity and the information object [7]. Subjective relevance considers relevance from the perspective of users’ knowledge and information needs [3]. This subjective approach sees relevance judgment as a product of personal perception that is closely connected to task and context [8]. Four types of subjective relevance are highlighted in [7]:

- Topical relevance: Here, information objects are relevant if the topic covered by the assessed information object is “about” the topic specified in the query or information need [4].
- Pertinence relevance: This relevance is measured based on the relation between user’s knowledge state and retrieved information objects as interpreted by the user [7]. Hence, this relevance is dependent on user’s conceptual knowledge, perceptions and intentions to assess relevance of retrieved information objects.
- Situational relevance: This is measured in terms of the relation between perceived situation/task at hand and usefulness of retrieved information objects for that situation/task. Hence, relevance is determined based on whether the user can use retrieved information objects to address a particular situation/task [4].
- Motivational relevance: Here, relevance is assessed based on whether the user is able to use the retrieved information object for the task/context [7]. Moreover, in motivational relevance, the broader community (context/environment) in which the user operates in is also responsible for measuring success of the relation.

3 Pilot Study

A pilot study was conducted to elicit initial subjective relevance features. The study aimed to elicit “desired” and “expected” design features from novices and experts for digital library interfaces supporting subjective relevance.

Subjects

Four subjects were selected to participate. Subjects were divided into two groups, Group A and Group B, to represent the needs of both expert and novice users respectively. Group A was made up of two PhD students with IR (information retrieval) training. Group B consisted of two Masters students without IR training. IR training in this context was defined as users who had undergone a module on IR in the course of their post-graduate studies.

Methodology

The study was conducted in two sessions, one for Group A and another for Group B. The methodology for both sessions was the same. To ensure subjects understood the concept of subjective relevance, they were first briefed about the objective of study and were given definitions of subjective relevance. After that, they were given 20 minutes to complete a task. The task was to gather information for a discussion on “The social impact of the Internet” using the ACM Digital Library (<http://www.acmdl.org>). The purpose of this task was to set a context to get them thinking about what design features might be important to help them assess relevance of documents. After completing the task in each session, subjects came together to brainstorm features that they thought were useful to help assess document’s relevance. Brainstorming is a technique used to generate creative ideas whilst suspending judgment of ideas [6]. During brainstorming, all features suggested by subjects were recorded. After brainstorming features, subjects were asked to indicate among the suggested features which ones were most important.

4 Findings and Analysis

A list of subjective relevance and usability features for experts and novices was gathered as findings. Features elicited from each session were matched with

characteristics of each type of subjective relevance. For features that could not be categorized under a subjective relevance type, further examination showed that these were usability features. Hence, remaining features for each session were organized based on characteristics of the ten heuristics outlined by Nielsen [5] for heuristic evaluation. This resulted in a list of usability features for experts and novices.

Due to space constraints, we can only provide examples from the lists of subjective relevance features and usability features for novices and experts to demonstrate how features in each list were coded and organized. Table 1 illustrates examples of features elicited, from novices and experts, for each type of subjective relevance. Table 2 illustrates examples of usability features elicited, from novices and experts, corresponding to five of the ten heuristics outlined by Nielsen [5]. Most important features for Tables 1 and 2 are indicated with an asterisk.

Table 1. Subjective relevance features for novices and experts

Type of Subjective Relevance	Feature (experts)	Feature (novices)
Topical relevance	Provide taxonomy of documents*.	Provide recommendation of related documents*.
	Provide artificial intelligence agents*.	Provide visualization of search results.
	Rank retrieved documents by relevance.	-
Pertinence relevance	Provide selected references used in documents.	Provide selected references used in documents*.
Situational relevance	Provide abstract of documents retrieved*.	Provide search option to search abstracts*.
Motivational relevance	Provide recommendation of what others have looked at.	Provide details of other people the author has worked with*.

In Table 1, experts and novices suggested interesting features for situational relevance. The features seemed to indicate that both experts and novices felt digital libraries had limited ability in retrieving documents for their contexts and tasks. Hence, they preferred to evaluate relevance of documents by going through abstracts.

Novices indicated more subjective relevance features in their list of most important features. This could be because novices did not possess as much domain knowledge and hence required more subjective relevance features to help them search and perform relevance judgments more effectively.

Subjective relevance features provided by experts tended to focus more on *topical* relevance. This might suggest that experts preferred to personally judge relevance of documents for their tasks but they would appreciate system support by indicating if the document was about the topic they were interested in. Among experts' most important features, a large portion was *usability* features. This might be because experts had the domain knowledge to evaluate relevance of documents for their tasks. Hence, they were more concerned with having a pleasant experience using the interface and that the interface allowed them to search and browse easily.

Usability features in Table 2 seemed to indicate that experts understood the information seeking process and that the results list was essential for relevance evaluation. At the same time, they also understood that a query was needed before a results list was returned and that users had problems constructing queries. Hence, they had suggested features to facilitate query formulation.

Table 2. Usability features for experts and novices

Heuristic Guidelines	Feature (Experts)	Feature (Novices)
Match between system and the real world.	Provide natural language searching*.	-
Consistency and standards.	Display results list*.	Allow preview of abstract before downloading PDF file.
Recognition rather than recall.	Provide search fields to facilitate searching*.	-
Flexibility and efficiency of use.	Provide search options, such as author, title, keyword search*.	Provide direct download of documents in PDF format*.
User control and freedom.	-	Provide "clear query" button*.

5 Discussion and Conclusion

The pilot study aimed to elicit a set of subjective relevance features for experts and novices. In general, the findings (of which only a subset is presented here) seemed to indicate that although subjective relevance features were important, experts were more concerned with the usability of interfaces supporting subjective relevance.

Results presented here are preliminary and part of on-going research to elicit subjective relevance features for user-centered digital libraries. Elicited features need to be further refined and tested before they can emerge as features and principles for the design of better digital library interfaces to address experts' and novices' needs. Future work could focus on expanding the pilot study to larger groups of experts and novices to elicit a comprehensive set of important usability and subjective relevance features for user-oriented digital libraries.

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