Quantifying users' perceptions of the results of online searches

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It is generally accepted in evaluations of online retrieval systems that more is better. High recall (the percentage of relevant documents retrieved) and high precision (the percentage of retrieved documents that are relevant) are both valued. On the other hand, many users probably don't want to be inundated with too many documents, even relevant ones, because the task of reading them all would be too burdensome. This preference is somewhat at odds with trying to maximize recall and precision. Therefore, it is reasonable to ask how users reconcile these issues when they are deciding how satisfied they are with the results of an online search.

The research to be presented uses a psychological theory of decision making and experimental methods to attempt to answer this question. In the experiment, users of online systems are presented with a variety of hypothetical search outcomes. They are asked to rate how satisfied they would be with the outcome of each search. The hypothetical searches vary in terms of precision and in terms of the total number of documents retrieved. A typical question presented to the users is "How satisfied are you with an online search that produces 40 articles, eight of which turn out to be relevant to your interests?" By using different combinations of the two quantities in the hypothetical searches (the number of documents retrieved and the number of relevant documents), it is possible to determine whether users feel it is more important to have a high precision ratio or to have a reasonable (neither too many nor too few) number of documents to read.

This data will be analyzed using a theory of decision making developed by Norman Anderson at the University of California at San Diego and known as information integration theory. Information integration theory is useful in modelling how humans combine separate items of information when making composite judgments. For example, it has been used to explore how grant administrators make use of various kinds of information about proposals, such as the scientific merit of the research, the prestige of the principal investigator, how well the proposal itself is written, and so on. Basically, information integration theory assumes that people informally assign numeric values to each of the kinds of information and then form a composite judgment by either adding or multiplying the values together. The relative size of the values for different kinds of information gives some indication of the relative importance of those aspects. Thus, information integration theory will provide a way to determine whether users are more concerned about precision or having a reasonable number of documents. The results of a pilot study already completed point toward the overall number of documents as the more important factor. The analysis of a full-scale experiment will be presented at the conference.

Another major point of interest in using information integration theory is whether an additive or a multiplicative combination rule is more appropriate for describing people's judgments in a particular realm. Depending on the situation and the entities being judged, people sometimes act according to an additive rule and sometimes according to a multiplicative rule. The presentation will include evidence as to which type of rule seems to apply to judgments of online searches. Data collected in the pilot study favor the multiplicative rule, but this will again be tested in the main experiment.