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A Model of Distributed Information Search on Relational Data

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Abstract

Searching relational data such as lab results in patients' chart can be a distributed search task where information is presented in different places and formats. Guided by a human-center process, we proposed a model of distributed information search for this type of data. In this model representation dimensions, data scales and search tasks types are the main factors considered for the search efficiency and effectiveness. The model is designed to serve as a foundation for the analysis of search tasks and effective design of search interface for relational data.

Keywords:

information search, lab result, information display

Model description

According to cognitive theory, the represented dimensions of a relational information display refer to the dimensions of an original domain in the world represented by various Relational Information Displays(RIDs). The representing dimensions refer to the physical dimensions of RIDs representing the dimensions of the original domain in the world. These two dimensions have to be matched in scales so as to guarantee the efficient and accurate representations between the display and the world. The information needed for carrying out a search task should also be matched in scales which are nominal, ordinal, interval and ratio and they have different strengths in operations. For example, if a search task is to find any abnormal triglyceride values on patient's chart, the representing dimension can be nominal scale; if a task is to find how much the patient's triglyceride is higher than normal, the representing dimension should be ratio scale.

Searching patients' records can be a comparison task within one patient or between different patients. The strategies are accordingly various if the search contents are different. A patient record contains both free text description and relational data which exists typically in the lab results section. The model contains localization, comparison and calculation, the three operations allowed by the properties of data scales. In this study, we employed lipid panel data to investigate the types of search tasks shown in the figure and the operations allowed by the power of data scales.

Discussion

For a type of clinical trial data, certain types of display are superior to other isomorphic representations in terms of search performance. A variety of studies have identified that the users such as clinicians and medical researchers may use the same data set in different ways. Search task efficiency can be improved by several factors that characterize human information behaviors. The focus of this research is on cognitive factors and their implications on human-computer interaction. Our model is particularly based on the interactions between user and computer-based information systems. This is because the computer system has the flexibility to generate isomorphic displays for the identical set of relation data.

There is no good display independent of tasks. The model with an inclusion of representation and tasks has its practical use for analyzing the search tasks of relational data. The analysis could provide a foundation for a better designed human-computer interface where data mapping, search content and search action are fully considered.

Understanding search task in scales helps explain task complexity, provide the proper representing data scales fornterface design and predict the search task feasibility on relational data.

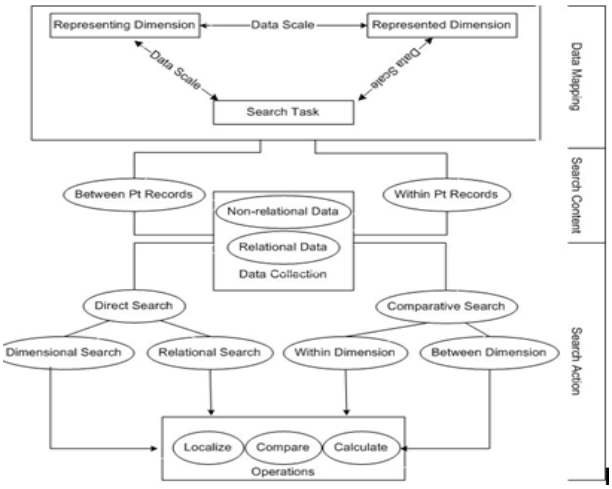

Figure 1 - Search model for relational data