Sarah: AN INFORMATION EXPLORATION AND VISUALIZATION INTERFACE FOR DIRECT MANIPULATION OF DATABASES

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INTRODUCTION

Generally, information exploration of databases is performed using query languages. Most query languages, such as Structured Query Language (SQL), are based on relational algebra or calculus. While relational algebra and calculus provide a powerful means to formulate and specify queries, their usage is an extremely tedious and complex task for computer users, especially for *naive* users. In addition, query languages are redundant in the sense that the same query may be expressed in many different ways. In fact, empirical research indicates a wide variation in response times in the implementation of different query languages. This research argues that providing a graphical visualization of the databases, queries, and search results empower users with the complex task of information exploration [1]. To provide graphical visualization, a new widget called *dynamic slider* (a multiple attributes presentation slider) is introduced. The *dynamic slider* enables the user to present multiple value ranges rather than a single or anchored value to minimum or maximum points.

TOOL DESCRIPTION

Sarah allows users to explore a database with graphical widgets, such as a *dynamic slider*. Specifically, *Sarah* enables the user to search a database without the need to create or formulate complex syntactical query statements. The *dynamic slider* and other widgets are utilized to assist users in mental visualization and representation of objects and actions.

Specifically, *Sarah* possesses the following capabilities and characteristics: (i) objects and graphical widgets of interest are continuously visible to the user, (ii) the outcome of the information exploration is produced by physical actions [1] such as manipulation of the *dynamic sliders* and other widgets rather than utilizing the complex query syntax, (iii) the provisions for incremental, rapid and reversible actions are immediately displayed for users, and (iv) a minimal learning curve, that aids naive as well as expert users in exploration of information. In essence, *Sarah* enables users to visualize and explore information similar to human cognitive information processing using minimal cognitive load. In addition, *Sarah* enables the user to see, in one view, objects, actions, and results, and assists the user in extracting the meaning and relationship of objects.

APPROACH

Several attempts to use direct manipulation for databases have been made. Examples include the user friendly query language called Picasso and Query-by-Example. Although these approaches are powerful, they do not provide visual presentation of information and actions. *Sarah* provides a more powerful interface by implementing the following guidelines: (i) continuous graphical representation of database, query and information exploration outcome, (ii) visible range of the object by utilizing *dynamic sliders* and other widgets [1], and (iii) immediate feedback as the user physically manipulates the sliders, selection buttons, etc.

CONCLUSION

Sliders have been used as a metaphor that assists the user in entering either single value or a single range value anchored to minimum or maximum points of a field. The concept of dynamic queries [1] has been extended so that the users can implicitly construct complex queries by utilizing visual and graphical techniques and tools such as *dynamic sliders*. *Sarah* is able to represent dynamic range(s) rather than a single or anchored value by utilizing *dynamic sliders*, which provides the mechanism for assisting the user in formulating more complex queries.

ACKNOWLEDGEMENT

REFERENCES

1. Ahlberg C., Williamson, C. and Shneiderman, B. Dynamic Queries for Information Exploration: An Implementation and Evaluation, *Human Factors in Computing Systems CHI'92 Conference Proceedings*, 1992, pp. 619-626.