

A FORTH BASED ICONIC INTERFACE

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ABSTRACT

This paper highlight the power of MacForth as a high performance interactive programming environment for the Macintosh Computer, in developping an interactive interface for integrated databases. We present the main specifications and some implemented commands of a command language based on icons. Objects to be manipulated are represented by icons. Properties are attached to each object and are also represented by icons.

INTRODUCTION

The evolution of database systems was characterized by an increase of the power of data manipulation languages. The need for a powerful interaction became necessary for users who are non specialized ones. Generally they wish a ready_to_use and simple system which does not require technical knowledge. The interface particularly evolved with the relational model allowing non procedural languages [1], [4], [5]. Recent techniques like the mouse, bit mapped displays and multiple_window screen management [11] enable users to directly and easily perform their tasks. In this paper we present the main characteristics of a language which uses icons as a support to easily manipulate various types of data: structured data (numeric or alphanumeric) and unstructured data (text, image, voice) which will be more required in an end_user environment. Examples are given in a medical context.

THE IMPORTANCE OF THE GRAPHICAL INTERFACE

After 1980, the availability of microcomputers [8] increased the need for a more sophisticated user interface and new languages were developed: DbaseIII [6], Knowledge_Manager [10], Ramis [13] and Microrim [14]. They provide a very simple way and powerful functions for interacting with the data. The advantage of a graphical query language was first noted by Zloof with QBE [15]. When an end user understands his own needs, he wishes a direct and visual interaction with the computer. He wants to query without having to worry about procedural details. CUPID [12] is another graphical language in which the user builds queries by light_pen manipulation of a set of symbols.

However, the interest in a graphical interface was not really emphasized before the beginning of the eighties when two forces converged: new developments of researches in graphics and image processing, and the availability of new interactive facilities. Such researches aim at utilization of database systems, and particularly relational systems for supporting images descriptions. A survey of the subject is given in [7]. A fundamental step for enhancement of the man machine communication is presented by Chang and Fu in [2], [3] as an extension of QBE: Query by Pictorial Example.

AN ICON BASED INTERFACE.

Our approach uses an iconic interface for directly handling both alphanumeric data and images. This interface is made up of a set of objects familiar to the user and of a set of operations which can be performed on these objects. We distinguish three areas on the screen as shown in Figure1.

The information area can contain the different kind of objects to be manipulated and also the properties associated with an object. Objects represented on Figure1 concern a stomach, a heart, lungs and a jaw. The properties appear in the information area by clicking on the selected object while this one appears in the workspace. For instance, diseases such as cancer, pleurisy, pneumonia (which can affect lungs), or cavity, crown, bridge,...(which can affect the teeth of a jaw). Notice that properties can also be represented by icons. The functional area contains the types of operations associated with the objects. We distinguish icons commands (creating or modifying icons), retrieval, global and functions. The workspace area is a window where an object (selected by clicking on the corresponding icon) can be manipulated using commands in the functional area. Figure2 shows an example of the use of the interface areas.

Figure3 shows lungs of a patient with a list of properties associated in the information area. They represent diseases of lungs. The user can select properties and assign them to lungs using only the mouse. The resulting object is modified or can serve as a model for a retrieval query. Figure4 exhibit some commands available in the functional area. Other examples in a medical context are given in [9]. Icons are used as a simplified support for image and textual manipulation. An important fact is that it is not always necessary to consider a precise and complete image of the object to understand the meaning of the underlying information (objects are generally familiar to the user).

All aspects of the present system have been implemented on a Macintosh, in MacForth.

CONCLUSION

The system we have designed is intended for users interested by the principle of "what you get is what you see". It uses an object oriented interface and a direct manipulation. The interaction is controlled by the system so that only sequences of authorized operations are allowed. We are now examining its extension to other domains of application.

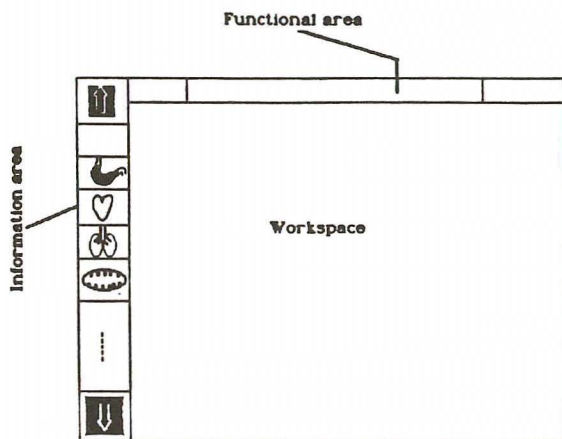


Figure 1. The areas of the interface

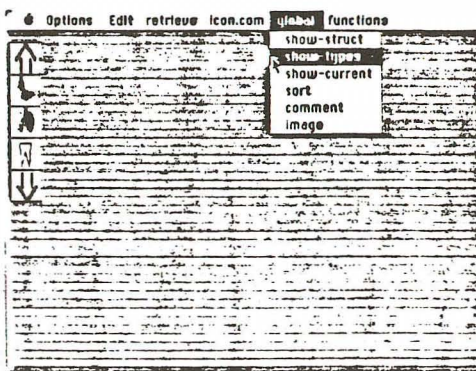


Figure 2.

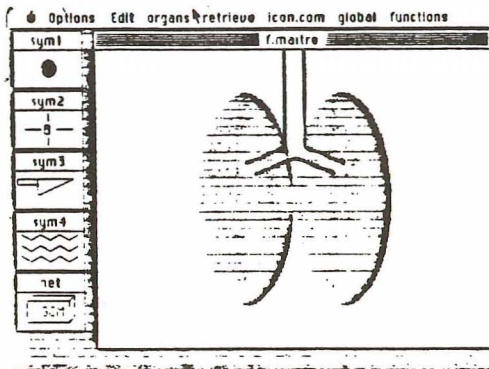


Figure 3.

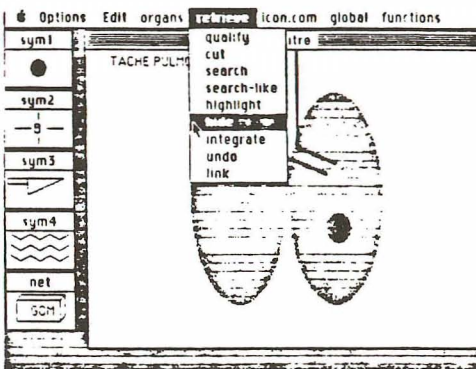


Figure 4.

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