

INFO BUTTON MANAGER

Improving clinical decision-making

The Problem

Almost twenty years ago, a landmark paper reported on clinicians' information needs. Since then, several studies have further examined this aspect of clinical decision-making. Although these studies considered the potential for computers to help with unmet needs, none has examined the specific information needs that arise during clinicians' use of clinical information systems (CIS).

While such interactions generally represent only a fraction of clinicians' work time, they are disproportionately important for several reasons:

- ❑ they occur when clinicians learn new information about patients,
- ❑ they occur when clinical decisions may be made (especially with order entry systems),
- ❑ information needs that arise during the interactions may be predictable (based on the CIS function being used),
- ❑ the clinician is in a setting (using a computer) in which information needs may be resolved, and
- ❑ the retrieval of relevant information may be accomplished automatically by combining the need prediction with the clinical information that triggers the need.

We have previously examined the technical feasibility of this approach by creating links within a Web-based CIS to **infobuttons**, context-specific questions that perform automated retrieval.

We showed that the technical aspects of the process are relatively simple, compared to the task of predicting the clinicians' information needs. Furthermore, the method of hardwiring specific

infobuttons to specific parts of the CIS not only makes them application-specific, but institution specific as well.

The Solution

We have developed an **Infobutton Manager** (IM), a table-driven approach that matches information about a computer user's context (what he/she are doing) with a set of information needs that are likely to arise in that context. Each information need is associated with a generic query to a particular information resource (the "infobutton"). The IM uses context information to transform generic queries into context-specific queries. These queries are returned to the user as a set of questions that, when selected, execute the queries for the user.

At present, the IM is used in the domain of Web-based clinical information systems and takes as its context information several parameters: institution, type of clinical application, type of user, age of patient, gender of patient, and specific clinical information being reviewed. Current *infobuttons* include links to resources such as PubMed, Micromedex, and the National Guidelines Clearinghouse.

Applications

This technology can be applied to any application in a clinical information system, and is independent of the institution. It can also be used in any domain (medical or non-medical) where information system users have information needs that arise, in part, from the specific task they are performing or specific information under review. The current implementation is Web-based but could be developed to run on any platform.

Intellectual Property Position

A patent application has been filed.

Technology Position

Info Button Manager technology is available for licensing.

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The Center for Advanced Information Management

Technology Overview

The Center for Advanced Technology Information Management at Columbia University is a joint effort of the Department of Biomedical Informatics (Columbia University Medical Center), the Computer Science Department (School of Engineering, Columbia University), the Center for Computational Biology and Bioinformatics, and the bio-imaging group in the Biomedical Engineering Department (School of Engineering).

Biomedical Informatics deals with the storage, retrieval, sharing, and optimal use of biomedical information, data, and knowledge for problem solving and decision-making. It touches on all basic and applied fields in biomedical science, and is closely tied to modern information technologies, notably in the areas of computing and communications.

Researchers in the *Computer Science Department* study theoretical and experimental aspects of many areas of information management and technology - foundations in mathematics, optimization, hardware design, software design, networks, user interfaces, databases, communications, and artificial intelligence. In particular, the department has concentrated expertise in digital library technology, digital government systems, and novel visual and graphical interfaces for information management.

The *Center for Computational Biology and Bioinformatics* (C2B2), is an interdepartmental center whose goal is to catalyze research at the interface between biology and the computational and physical sciences. It encompasses the Columbia Genome Center and Center for Systems Biology. C2B2 supports research programs in computational biophysics and structural biology; modeling of regulatory, signaling and metabolic networks; pattern recognition; machine learning; and functional genomics.

The approach of the *Biomedical Imaging Lab* includes both basic science (e.g. image acquisition) and clinical applications (e.g. evaluation of image quality). BMIL's scope is broad, including image formation, qualitative analysis, evaluation and quantitative measures. Studies are aimed at imaging structures at the molecular, cellular, tissue, and organ levels.

CAT Mission

The goal of the Centers for Advanced Technology program is to support cutting-edge research at major New York State research institutions, and to make the resulting technology available to industry for commercialization. CATs work with industry partners in several ways to achieve this goal. Inquiries are welcomed.

The *Center for Advanced Information Management* at Columbia University is a NYSTAR Designated Center for Advanced Technology.

