Health information retrieval tool (HIRT)

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Abstract. The World Wide Web (WWW) is a powerful way to deliver on-line health information, but one major problem limits its value to consumers: content is highly distributed, while relevant and high quality information is often difficult to find. To address this issue, we experimented with an approach that utilizes three-dimensional anatomic models in conjunction with free-text search.

Introduction. Consumers, both health care professionals and non-health care professionals, seek health-related information through search engines that provide basic search screens to allow users to enter key words or phrases. However, a lack of domain knowledge and unfamiliarity with medical vocabulary and concepts restrict consumers’ ability to obtain the information they seek successfully. With this in mind, we designed and developed a prototype that allows users to select three-dimensional anatomic structures according to user preference or interest, as an alternative to searching for information by free-text input in a search field. In using a spatial paradigm, our prototype intends to overcome some of the problems of text-based search.

System Design And User Interface. HIRT is linked with Unified Medical Language System (UMLS) using ODBC to retrieve the desired anatomical concepts, terms and relationships. It consists of three main components: (1) Anatomical browser: The three-dimensional torso skeletal model is based on polygonal surface data using features of Java3D. The visualization model is made up of objects. Each object has been indexed according to the UMLS’s anatomical concepts via a concept unique identifier (CUI). This CUI is used to retrieve relationships between anatomical concepts. Within the anatomic browser, users are allowed to view the three-dimensional skeletal model from different angles. (2) Concept-relationship browser: The concepts associated with each anatomic structure and their relationships form a dynamically generated anatomic hierarchy. The hierarchical tree structure allows us to implicitly derive properties of offsprings based on their ancestors and displays these to the user in the concept-relationship browser. The user can also search for the same medical information through the generated anatomic hierarchical tree by clicking a leaf node of interest. (3) Resource view panel: When an anatomical structure is selected for a search, associated anatomical terms retrieved from UMLS through its CUI are sent as query terms to the MEDLINEplus database. Health information related to these terms in the form of articles or abstracts are retrieved and displayed within the resource view panel.

Limitations. The main limitation of our prototype is that the anatomic features may not be appropriate for searching for health information that is not directly associated with specific anatomical objects.

Future Work. Future work includes utilizing a model of the entire body, so that consumers will have more choices in selecting anatomic structures of interest. We plan to conduct a pilot study by introducing our application at Brigham and Women’s Hospital’s web site where an initial study has already been carried out.

Conclusion. We believe that providing anatomical information will be helpful for the retrieval of information relating patient problems to the diagnosis and treatment of related diseases. Ultimately, using a three-dimensional visualization model in IR could achieve the following benefits: it could minimize the consequences of spelling errors that occur in basic free-text search, and allow simultaneous visualization of relationships between anatomical structures, associating this with up-to-date health information.

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