



Developing a visual-aid relevance feedback biomedical literature retrieval system: a prototype construction

Tzu-Heng Chiu

Associate Professor, Center of General Education /
Associate Director of the Library, Taipei Medical University

tzchiu@tmu.edu.tw

I-Jen Chiang

Associate Professor, Graduate Institute of Medical Informatics,
Taipei Medical University

ijchiang@tmu.edu.tw

Introduction

This research presents a biomedical literature retrieval system prototype, called Visual Medline, and reviews two surveys conducted in 2010 and 2011 respectively. The results concluded in this study will be used as references for refining this information visualization system in the future.

Prototype Development

In 2010, the researchers developed 1st version of the prototype, named Visual Medline, representing the visual aided PubMed.

2010 prototype sent the query right to PubMed promptly. While receiving results from PubMed, they were processed and clustered, and then displayed in a hierarchical ontology structure; key fields of articles were retrieved and displayed by relevant order; the tag cloud was generating the top 20 mostly appeared terms on the same page, in the order of the appearance frequency.



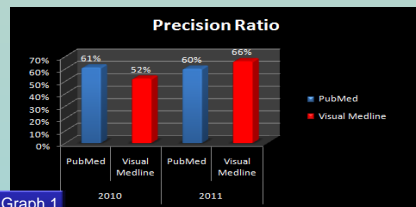
Prototype 2010

In 2011, the authors modified the user interface, adopted search filters, and changed hierarchical ontology presentation to a radial display. The current prototype first collected all citations from PubMed and stored them locally, indexed data by aforementioned search filters. So that nearly 21.5 million citations from PubMed can be processed and displayed expeditiously. Next, the indexed data was clustered and displayed in a radial format. Abstracts and key fields of the found citations and abstracts were listed in relevant order with highlighted key terms, just as the 2010 prototype.



User Testing

The researchers asked participants to perform same search query on both PubMed and Visual Medline, and to check the precision ratio on both systems based on the first 10 search results. Graph 1 shows the precision ratios of both PubMed and Visual Medline of prototypes from 2010 and 2011.

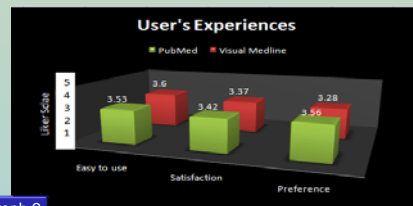


Graph 1

We see that PubMed stays almost the same ratio (61% v.s. 60%). However, from the precision ratios of two Visual Medline prototypes, it went up 14% more (52% v.s. 66%). This finding indicates that after revising the user interface and data process technique, the system's performance of the 2011 prototype is much better than the 1st version.

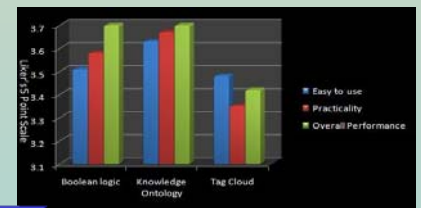
Conclusion

At the present time, Visual Medline is still refining; all testing will be accomplished and be officially launched on TMUL. The visualization clustering technology will be transferred to a medical database vendor of Taiwan's.



Graph 2

Graph 2 shows that, in terms of "Easy to use", users gave slightly higher point to Visual Medline than PubMed. This may indicate that the visual aided relevance display helps to branch out relevant terms more easily than just plain text listing. However, in terms of the "Satisfaction" and "Preference", Visual Medline received slightly lower score than PubMed. Comparing with PubMed, one that was launched for 15 years since 1996, and was widely used among the world, the prototype of Visual Medline got close scores, which shows a very positive sign after all. Besides, the researchers asked if participants would like to recommend Visual Medline to others, nearly half (46.51%) of them would recommend to others.



Graph 3

Graph 3 shows users' satisfaction on Boolean logic technique, radial knowledge ontology, and the tag cloud, in terms of "easy to use", "practicality", and "overall performance". All of them score more than 3. This indicates that users think positively toward Visual Medline in general.

Table 1 lists the qualitative feedback analysis categorized in positive and Negative feedbacks.

Category	Sub-category	Times being mentioned (n=43)
Positive Comments	Tag cloud saves time on sorting results	6
	Tag cloud is clear and easy to follow	6
	Creative user interface design	5
	Precision ratio is higher than PubMed	4
Negative Comments	Knowledge ontology helps me on extended searches	4
	Citation display helps me on scanning results	1
	Home page is too simple, lacks of user instructions	7
	Search filters are less clear than PubMed	7
	Response time is too slow	4
	Operator-generate buttons is needed	1
	English-Chinese Translation is needed	1
Recall rate is low	1	