BUSCLIMED: MOBILE APP FOR SEARCHING MEDICAL LITERATURE

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Abstract

The World Wide Web is evolving into a Web of Linked Data. A wide amount of linked data has been published in freely accessible datasets, due to the Semantic Web spread, and to the recent Linked Open Data initiative promoted by the father of the web, Sir Tim Berners Lee. There are many health and biomedicine datasets, connected with other datasets that allow people to search and retrieve medical information in an agile way, different to the traditional information retrieval methods. We have developed a mobile app for exploiting linked medical resources by physicians, students, nurses and other healthcare professionals. With our mobile application, over 20 million abstracts and medical references can be consulted.

Keywords

Mobile, Healthcare, Bioinformatics, Linked Data, Health Informatics

Introduction

In the last years we have witnessed how the traditional way of finding information on the Internet using a PC, has given way to information searches using mobile devices, letting people get information anywhere, not being tied to desktop computers at home or the office[1]. Although more and more people use mobile devices for searching documents nowadays, the traditional way for doing it, this is, using classic search engines, are not very user friendly because of the smaller screens. That's why ad-hoc apps for searching information in a specific domain can improve the user experience when using mobile devices for this task.

In this paper we present an application for searching abstracts and references to medical literature using mobile devices, and the results of an evaluation about its usability conducted with students. First we will introduce the different information sources. Then we will comment the system architecture and finally we conclude explaining how we have evaluated the usability of the app.

Information Resources

Our mobile application can retrieve information from four different biomedical sources: Pubmed[2], Medline Plus[3], National Drug File[4], and Freebase[5].

Freebase (owned by Google) is a collection of structured data (online database) coming from various sources that aims to allow people and machines to access the full knowledge base more efficiently[6]. Our app builds a query restricted to "/medicine" domain.

MedLine Plus is a free web site with information about health topics for patients, families, and healthcare professionals. It is produced and maintained by the United States National Library of Medicine

PubMed is a service that allows you to search in the Medline database, which has one of the largest collections of biomedical research articles in the world.

The National Drug File (NDF) includes information on clinical drugs, drug classes, ingredients and National Drug Code (NDC) Directory codes. It is a centrally maintained electronic drug list used by the VHA hospitals and clinics.

System Architecture

When the user types a term and taps on the search button, four different queries to web services are launched in parallel to consult the different data sources: Freebase, Pubmed, Medline Plus and the National Drug File. Not all services return results. Calls to National Drug File works only when the term is a medicament. In Figure 1 we can see architecture of the software.
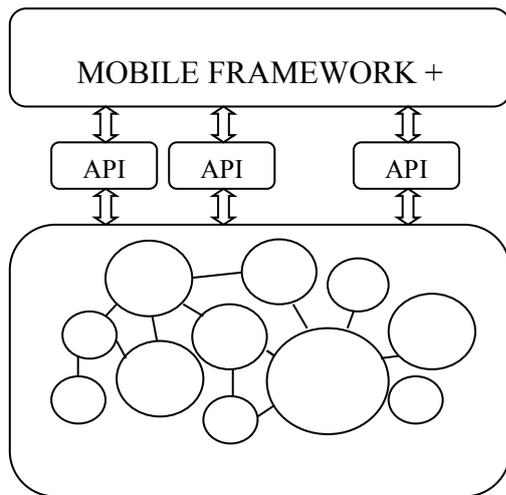
Fig. 1: Architecture for domain-specific information retrieval mobile application.

Abstracts can be retrieved and ordered using different criteria: i.e. date, author or relevance. We have configured our app to show results ordered by relevance but, although is no implemented yet, we are planning to add a feature for selecting the order of the documents in the results page.

The user interface was made using jQuery mobile framework and it has three main pages: A landing page with a search box and a big button for making the query, a page with the options menu where the user can select what kind of information wants to see, and an information page where we show the results found and other useful information to the user. Figure 2 shows the user interface of the app.

Fig. 2: Different screenshots of the app.

Once the app was finished, we built packages for the major operating systems: iOS, Android and Windows Phone using the framework Apache Cordova[7].

Usability Evaluation

A questionnaire was designed to evaluate the usability of our app. The main question we want to answer is: Is the system easy to use?

The purpose of the usability test was to identify strengths and weaknesses of the architecture applied to this domain and improve the design of the system. This way, the results and conclusion extracted from this test usability gave us a very useful tool to enhance it.

The study was held with a group of second year computer science students. They covered two main characteristics of end users: they don't have previous knowledge about medical field and they are used to technological devices. The experiment was carried out in the student's classroom, they used his own devices and three researchers of the project were present in order to write down difficulties appeared and observations about the experimental session.

A survey was used for gathering data, because this method provides an efficient and fairly easy way to gain insights, change practices and measure effects. Students were asked to rate different aspects of the app with a series of questions (rated from 1-5, where the score 1 means strongly disagree and 5 strongly agree), with a field of observations to enable the student to include any comments to help us see how he interpreted the question or why has evaluated in a certain way. Table 1 shows the questions of the survey.

Tab. 1: Questionnaire for evaluating user experience.

Number	Question	
Q1	My overall experience has been satisfactory	
Q2	I managed to find the information I needed	
Q3	The quality of the information received is adequate.	(1)
Q4	I would use this system in the future	
Q5	I would recommend this system to others interested in health information	

The response rate was 85%. Two of the student couldn't finish the task because of technological issues. Fig. 3 shows the results. As it can be seen, students considered the experience with the system quite good (question 1).
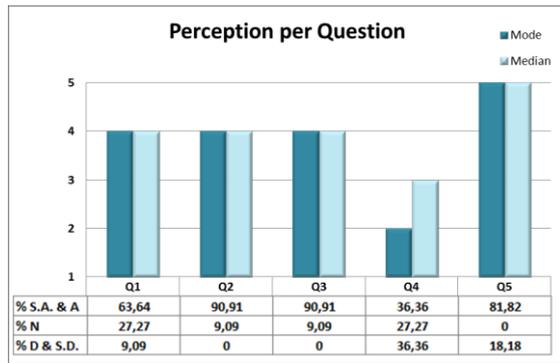
	Q1	Q2	Q3	Q4	Q5
% S.A. & A	63,64	90,91	90,91	36,36	81,82
% N	27,27	9,09	9,09	27,27	0
% D & S.D.	9,09	0	0	36,36	18,18

Fig. 3: Mode, median and percentage values of students perceptions per question.

Conclusion

As a conclusion we can state that a mobile application for searching medical literature can be very useful for healthcare professionals and students. Mobile devices let people get information not being tied to desktop computers, and user experience, when accessing heterogeneous medical resources and datasets from the web using mobile devices, can be improved if we exploit the benefits of Linked Open Data, and show relevant information and bibliography with a mobile app and a unified interface for showing different medical resources.

Acknowledgement

References

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