

Towards the Characterisation of Medical Apps from Their Descriptions

Stefano Bonacina^{a,b}, Valentina M. Bolchini^b, Francesco Pincioli^{b,c}

^aHealth Informatics Centre, Department of Learning, Informatics, Management and Ethics, Karolinska Institutet, Stockholm, Sweden

^bDipartimento di Elettronica Informazione e Bioingegneria, Politecnico di Milano, Milan, Italy

^cEngineering for Health and Wellbeing Group, Istituto di Elettronica e di Ingegneria dell'Informazione e delle Telecomunicazioni (IEIIT), Consiglio Nazionale delle Ricerche (CNR), Milan, Italy

Introduction

Mobile devices and apps have completely changed our lives, including the approach to healthcare. In fact, medical or health mobile applications (hereinafter referred to as 'medical apps') are more and more available on app's stores (e.g., Apple Store and Google Play), and downloaded by consumers, or patients. However, downloading the right apps is still a challenge.

To guide the consumer, the patient, or the doctor, in selecting the right apps some methods and strategies were developed by different research groups or national health organizations. First, our previous research aimed at developing and testing a Pictorial Identification Schema (PIS) for an extensive user-oriented identification of medical apps. Then, at the Peter L. Reichertz Institute for Medical Informatics, Hannover Medical School, Germany, researchers developed an App Synopsis (AS), i.e. a checklist, for assessing the trustfulness of an app. Finally, the UK National Health System (NHS) implemented the "Health Apps Library", a catalogue of apps tested, and evaluated by NHS experts. However, that initiative is now under revision for improvements.

The aim of this project is to develop a computer application to allow patients - without specific medical knowledge - to characterise medical apps by a lexicon analysis of the descriptions published on the app's stores. The system is also thought to allow the healthcare professionals to speed up the advanced search of apps to recommend them to their patients. The concept on which this work focuses is as follows: the app description - free text published by the app's developers in an app store - is the only information sources apps have in common. Our hypothesis is that the extent of the specialized medical language used in the descriptions can help the understanding of the helpfulness of an app.

Materials and Methods

According to the software development process, we developed a computer application by Microsoft Access 2010, to collect the descriptions of apps available in the app stores, and their reviews published on the iMedicalApps.com website. The application is based on a relational database that models the structure of the app descriptions and their reviews in terms of entity types and attributes (metadata). In addition, terms from the Consumer Health Vocabulary have been included to tag the medical terms of the app descriptions. By defining queries in Structured Query Language, we defined a characterisation index based on the percentage of the medical terms included. To

compare the apps within a medical domain, we grouped them according to that percentage. To this end, we divided the range from the minimum percentage of medical terms to the maximum one into five classes. Consequently, the apps were assigned to those classes. Then, we tested the application by a number of app descriptions (60 descriptions of 48 apps) of the "pharma" domain from the Apple Store and the Google Play store. We choose that domain as we considered it for the development of the PIS. Descriptions and metadata were manually entered in the application and the data entry was checked.

Results

The application we developed consists of a database to collect and manage the apps descriptions and metadata, and a user interface to interact with the users. For the "pharma" apps, Class I (2,82-10,84%) holds the 13% of the descriptions, Class II (10,84-18,86%) the 43,3%; Class III (18,86-26,89%) the 33,3%; Class IV (26,89-34,91%) the 8,3%, and Class V (34,91-42,93%) the 1,6%. Summarizing, the 90% of the total apps includes less than 26.89% of medical terms (Classes I - III).

Discussion

In this project we proposed a characterisation of medical apps based on a lexicon analysis of their descriptions, automatically performed by the developed application. Other classification methods are based on subjective evaluation. The PIS provides a graphical view to represent the strengths and weaknesses of a single app, according to different user's types. Then, to express a judgment about app trustfulness, the AS requires the user to subjectively answer 11 questions. From the test results, it appears that the most of "pharma" apps has poor medical contents. Future work includes the tests of apps from other medical domains, an evaluation of the user interface, and the improvement of the algorithm for the index calculation.

Acknowledgments

Some preliminary results of this project were presented to the Conference Apps for Medicine Health and Home Care – Elements of Safety and Effectiveness, Politecnico di Milano, Italy, 8-9 May 2014. (<http://www.ehealth.polimi.it/appqa.asp>).

Address for correspondence

Stefano Bonacina (stefano.bonacina@ki.se), Health Informatics Centre, Department of learning, informatics, management and ethics, Karolinska Institutet, Tomtebodavägen 18a, 171 77 Stockholm, Sweden.