Search behavior and use of visual medical information by health-care operators: towards a survey study

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Abstract

Images and visual information in general are produced in increasing quantities in health care settings. The variety of their use has increased as well. They are used for many tasks such as diagnosis, treatment planning, research, and teaching. Many health care institutions have started to make all images available in digital form as part of the electronic health record. Despite its importance, little is known about how health care professionals would like to access images or search for them, particularly for teaching or research. To learn more about the image use and search behaviour, we developed a questionnaire for interviewing health-care operators, and we started a survey of image users at the "Azienda Ospedaliera Sant'Andrea" in Rome, Italy. The results of this survey will be used to create query topics for an international benchmark in medical visual information retrieval to investigate its value in the health care setting.

1 Introduction

Images are ubiquitous in modern medicine. They are produced for a variety of reasons in diagnosis, treatment planning, research, and teaching, and the quantities produced are rising rapidly [1]. The digital form makes these images also available for a large number of new tasks, as much information is stored in the images

in connection with the medical record. Case-based reasoning and evidence-based medicine [2, 3] could potentially benefit from the inclusion of images in the information search. While textual search for medical information has been quite investigated [4, 5], much less is known on the search behaviour for and use of visual medical information. Content-based image retrieval based on visual image properties has been a very active research domain in computer vision for several years [6]. For the medical domain it has been proposed many times [7, 8, 9] and its potential to help in areas such as diagnosis and image management has been recognized. Still, despite a variety of research prototypes [10], only tthree clinical studies exists on the use of image retrieval as diagnostic aid [11, 14, 12], both with less than 20 interviews. Since 2004, a benchmark for medical image retrieval has existed in the ImageCLEF6 initiative (Image Cross Language Evaluation Forum, [13]). In a first test, only visual capabilities of medical image retrieval systems were tested in 2004. In 2005, however, realistic query topics were created based on a user survey similar to the one described in this paper and carried out at Oregon Health and Science University (OHSU) with 15 persons [14]. With the goal of obtaining more and a wider variety of results, a similar study was planned at the "Azienda Ospedaliera Sant'Andrea" in Rome, Italy. Only when information needs are understood, real tasks can be created to evaluate retrieval systems.

2 Methods

A qualitative user survey was planned among medical professionals on their image use behaviour and the way they search for visual medical information. The goal of the survey was to gain insight into the ways that visual information is currently treated and used, and to identify techniques that can be employed to meet new information needs. Our first step was to create a questionnaire that contained all the relevant information for the task while speeding up the process, as opposed to the free interview approach adopted in [12, 14]. On the basis of results obtained in previous surveys of this type and on the basis of the clinical experience of the team leaded by Dr. Chiacchiararelli, we developed a multiple-answer questionnaire with several questions, spanning from age and gender to user's behaviors. The questionnaire was intended for use in an Italian hospital and it was therefore written in Italian. A translated version of the questionnaire is available for download from

the EuCognition web-site.

3 Preliminary Results

We collected so far 8 interviews. Persons selected for the survey were chosen based on availability (students, radiology interns) and knowledge on their interest for image use (based on a previous survey on acceptance of digital radiology in the patient record). They were from many different departments (Radiology, Surgery, Paediatrics, etc.). Our goal was to recruit individuals who performed the following functions in the health care setting: Clinician, Researcher and Student. If a person had more than one function, the interviewer asked the questions separately for each function. Two interviewers shared the task to visit the surveyed individuals in their workplace. Our final goal is to collect at least 50 interviews and to publish the obtained results in a medical journal; this would make this survey the biggest ever presented so far in the literature.

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