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Augmented Reality: Real-Time Information Concerning Medication Consumed by a Patient

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Abstract

This paper describes a mobile prototype capable of recognizing characters from a photograph of a medication package. The prototype was built to work on the iOS platform and was developed using Objective-C and C programming languages. The prototype, capable of recognizing text out of an image, included image processing algorithms, text processing algorithms, and techniques to search and handle information from a database. This prototype is presented as an option for capturing reliable and validated information by using new technologies available to the general population.

Keywords:

Personal Health Record, Mobile Health, Optical Character Recognition, Image Processing.

Introduction

Self-medication is common, so a process for registering medications used by a patient is essential for finding discrepancies and improving the effectiveness and safety of treatments. Personal health records (PHR) facilitate doctor-patient communication and allow the patient to participate actively in self-care.

The objective of this paper is to describe the tools and algorithms used to build a mobile prototype that can recognize text from a photograph of a medication package. Integration between the PHR and this prototype is not described in this paper since the prototype is still in the conceptual definition stage. Likewise, the prototype has not been tested with real patients.

Materials and Methods

A prototype was built to work on the iOS platform and developed using Objective-C and C programming languages.

Results

During the first phase of this work the image was resized to 640 by 640 pixels. Next, the image was converted to grayscale and an engine named Tesseract was invoked to recognize characters as text. With the data obtained from this procedure, all the characters that did not belong to the alphanumeric set were removed and all words containing fewer than three characters were ignored. Then, the Levenshtein distance between the recognized words and the ones in a product database was calculated in order to select those with the smallest possible edit distance. Following this procedure, the product and its main components were identified.

Table 1 – Accuracy after first phase

Complete	Partial	Error
41.66%	6.25%	6.25%

Table 2 – Average time to process images recognized during first phase

	First processing	Call to Tesseract engine	Text proces sing	Text valida tion	Datab ase search
Time (s)	0.0435	0.4951	0.0055	0.8637	0.1573

In the second phase the images were processed with a thresholding algorithm as a segmentation method. The threshold value used for this task was the mean value of the pixels of each image. Once preprocessing of the image stage finished, the Tesseract engine was invoked again and the text processing method was repeated. With this information we looked up the product in a database and got the pharmaceutical information.

Table 3 – Accuracy after second phase

Complete	Partial	Error
33,33%	2.08%	8.33%

Table 4 - Average time to process images recognized during second phase

	Second processing	Call to Tesseract engine	Text proces sing	Text valida tion	Datab ase search
Time (s)	0,0499	0,3201	0,0648	0,5842	0,2505

Conclusion

Patients' communication with the doctor about medicine consumption is necessary for the doctor to make accurate diagnoses. This prototype can capture medication information using new technologies available to the population.