Name(s)	**Project Number**
Shalin V. Shah	**S1421**

Project Title

Voice: Computer Vision Algorithms to Counter Age-Related Macular Degeneration, Glaucoma, and other Pathological Typhlosi

Abstract

Objectives/Goals

Most everyday items are not formatted for Braille and audio. Furthermore, of the 7.3 million blind people in the US, 90% can#t even read braille. So blind people are very limited in the amount of content they can read. The goal of this research was to build an algorithm that can effectively guide a blind person into taking a picture using assistive computer vision, and then read the words that are on that picture aloud. The research also improves the accuracy of the reading through the various image modifications.

Methods/Materials

The Voice algorithm was built in the programming language of Objective-C. It uses Google Drive#s Application Programming Interface for the Optical Character Recognition because of the multi-language functionality. Also, the front end of the application uses the iOS platform and thus requires either an iPhone, iPad, or iPod to run. The image processing occurs in the background. The algorithm was tested in both light and dark condition with a variety of distances ranging from 5 inches to 2 feet. Additionally, it was tested on various reading material such as newspapers, museum placards, medicine labels, expiration dates, can labels, and more. It was also tested by many blind people over a spread out time interval. Each time, new functionality was added in order to fix the problems that were exposed and improve the usability for blind people. So over multiple iterations, the application improved through added functionality.

Results

The results proved that guiding the blind user through taking a photo did assist them greatly in using the front-end application and taking good quality photos. Additionally, the silent photo manipulations done by the algorithm also help increase the quality of the spoken text because of the improved lighting, contrast, and orientation on the modified image.

Conclusions/Discussion

The algorithm can successfully guide the blind user into taking apt photos of many different items that are not formatted for braille or audio and read the words from the images out loud in a matter of seconds. It can read those words in around thirty different languages. Also, it can read many pages one after another without using additional time because as one image is being read, the next is being processed. So it can read items such as magazines and book pages one after another.

Summary Statement

Using computer vision algorithms, I created an application that guides blind people into taking a photo of everyday items (not available in Braille/audio) like nutrition facts and medicine labels, and reading the words from that image aloud

Help Received

None. I designed, built, and performed the experiments myself.