A Cloud-Based Image and Content Reading for Visually Impaired

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ABSTRACT

Visually impaired individuals are a growing segment of our population, the inability to read has a substantive negative impact on their quality of life. Printed text (books, magazines, menus, labels, etc.) still represents a sizable portion of the information this group needs to have unrestricted access to. Hence, developing method by which text can be retrieved and read out loud to the visually impaired is critical. In this work, we discuss the design and implementation of assistive platform, in this combine today's smart phone capabilities with the advantages offered by the rapidly growing cloud resources. The approach makes use of an Optical character Recognition (OCR) engine on the cloud and use local resources for the Text-to-Speech (TTS) conversion. Prototypes are successfully developed and tested with favorable results.

Key Words: *Visually impaired, OCR, text-to speech and Smartphone's.*

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1. INTRODUCTION

Reading is very essential in our daily lives. Out of 314 million visually impaired people all around the world [1], 45 Million are blind and new cases being added each year. Recent developments in computer vision, digital cameras, and portable computers make it feasible to assist these individuals by developing camera-based products that combine computer vision technology with other existing commercial products such optical character recognition (OCR) systems. Printed text is everywhere in the form of reports, receipts, bank statements, restaurant menus, classroom handouts, product packages, medicine bottles etc.

There are many assistive systems available today but they have certain issues reducing the feasibility for the visually challenged persons. For example, portable bar code readers designed to help blind people identify different products, it enables the users who are blind to access Information about these products through speech and Braille. But a big limitation is that it is very hard for blind users to find the position of the bar code and to correctly point the bar code reader at the bar code. There are systems like K Reader Mobile it runs on a cell phone and allows the user to read mail, receipts, fliers, and many other documents.

However, the document to be read must be nearly flat, placed on a clear, dark surface (i.e., a no cluttered background), and contain mostly text. Furthermore, K Reader Mobile accurately reads black print on a white background but has problems recognizing coloured text or text on a coloured background. It cannot read text with complex backgrounds. The main aim is to develop such a system that will read the texts from complex backgrounds successfully.

2. RELATED WORK

Yang, Yingli Tian Chucai Yi Aries Arditi "Context-based Indoor Object Detection as an Aid to Blind Persons Accessing Unfamiliar Environments" 2010 computer vision based indoor way finding system is implemented for blind people to independently access unfamiliar buildings. A blind person can find different rooms and building exit or an elevator. This system includes text recognition. It detects doors based on general geometric shape, by combining edges and corners. To differentiate between an office doors from a bathroom door, it extract and recognize the text information. [2] The system use OCR and location can be delivered through speech for blind travelers.

[3]Xiaodong Yang, Shuai Yuan, and YingLi Tian "Recognizing Clothes Patterns for Blind People by Confidence Margin based Feature Combination" clothes pattern can be recognized using this system. There are many clothes patterns. This system is classifying clothes patterns into 4 categories: stripe, lattice, special, and pattern less. In this system texture analysis methods only focused on textures varying with distinctive pattern changes. Due to large intra class variations in each clothes pattern category. It cannot achieve level of accuracy for clothes pattern recognition. Extracting statistical and structural feature from image wavelet sub bands can be a solution of this problem.

Detecting Boris, Epshtein Eyal, Ofek Yonatan Wexler "Text in Natural Scenes with Stroke Width Transform"2010. A novel image operator used to find the value of stroke width for each image pixel. [4] It is used in text detection in natural images. The suggested operator is data dependent and local, which makes it fast and it is strong enough to reduce the need for scanning windows or multi-scale computation. Extensive testing shows that the suggested scheme outperforms the latest published algorithms. Its simplicity allows the algorithm to detect texts in many fonts and languages.

Asif Shahab, Faisal Shafait, Andreas Dengel "ICDAR 2011 Robust Reading Competition Challenge 2: Reading Text in Scene Images" 2011 International Conference on Document Analysis and Recognition of Text in natural scene images is becoming a prominent research area because imaging devices like mobile phones are available[5]. The ICDAR 2011 Robust Reading Competition was organized to evaluate the performance of recent algorithms in recognizing and detecting text from complex images.

In [6] Sneha Sharma, Dr. Roxanne Canosa, advisor ``Extraction of Text Regions in Natural Images" 2007 The detection and extraction of text regions in an image is a well known problem in the computer vision research area. The goal of this project is to compare two basic approaches to text extraction in natural (non-document) images: edge-based and connected-component based. The algorithms are implemented and evaluated using a set of images of natural scenes that vary along the dimensions of lighting, scale and orientation. Accuracy, precision and recall rates for each approach are analyzed to determine the success and limitations of each approach. Recommendations for improvements are given based on the results.

In [7] Dimitrios Dakopoulos and Nikolaos G. Bourbakis, Fellow, ``Wearable Obstacle Avoidance Electronic Travel Aids for Blind: A Survey" IEEE 2010\\ The Variety of portable or wearable navigation systems have been developed to help blind people during navigation in out indoor or indoor environments. There are three main categories of these systems: Electronic travel aids, and position locator devices, electronic orientation aids. This paper is a comparative survey of wearable obstacle detection systems to users and informs the research community about the capabilities of these systems and about the progress in assistive technology for visually impaired people. The survey is based on various performance parameters and features of the systems that classify them in categories.

In [8] Bharat Bhargava, Pelin Angin, Lian Duan " A Mobile-Cloud Pedestrian Crossing Guide for the Blind" This system help blind and visually-impaired persons to detect the status of pedestrian signals at street for safe outdoor navigation.This system propose a mobile-cloud collaborative approach for context aware outdoor navigation, where

it use the computational power of resources made available by cloud computing providers for real-time image processing. The proposed system architecture has the advantages of being minimal infrastructural reliance and extensible, thus allowing for wide usability. The proposed approach is for real-time crossing guidance for blind pedestrians.

In [9] Yingli Tian, Chucai Yi ``Assistive Text Reading from Complex Background for Blind Persons". This paper presents a system for blind persons to read text from object and signage that are held in the hand. The system read text from complex backgrounds and then communicates this information aurally. They design a novel text localization algorithm to localize text regions in images with complex backgrounds, by learning gradient features of distributions of edge pixels in an Adaboost model and stroke orientation. Optical character recognition (OCR) software is used to recognize Text characters in the localized regions and transformed into speech outputs. The performance of the proposed system is evaluated on ICDAR 2003 Robust Reading Dataset.

In [10] Yasar Guneri Sahin*, Baris Aslan, Sinan Talebi, Ayberk Zeray ``A SMART TACTILE FOR VISUALLY IMPAIRED PEOPLE"2015. The impaired persons have many difficulties in society. One of the most significant difficulties is traveling because of inappropriate city designs. Recent developments in technology have enabled several facilities, such as tactile paving surfaces, to improve their lives, but so far there is no comprehensive solution to the problems they face. This study proposes a new, cost efficient and simple system, which consists : tagged paths and batons to make traveling alone possible.The proposed system is available for Android mobile devices and IOS and consists of two software applications, “Out Guide”, and “In Guide” for indoor and outdoor environments respectively.

3. PROPOSED SYSTEM

The proposed system helps visually impaired persons to read product labels. Users have to capture image and then system read out the text from image .It will be very useful for Persons those are going through optical surgery. It can be useful for road side text detection so that visually impaired person can travel independently. The proposed system provides effective solution as Compared to most of the existing systems.

Image Capture Module

The image capture module will detect the image captured by the Camera attached to the mobile. This will be easy for the visually impaired person to capture the image as the camera will be situated on the mobile. The image captured will be converted into grayscale and binarization.

Image Correction Module

This module will correct the image by reducing the noises by mean of filtering algorithm like median filter so that the text will be effectively recognized.

Text Extraction Module

This module will recognize and extract the text. This will be achieved using OCR-Optical Character Recognition - is the mechanical or electronic conversion of images of typed, handwritten or printed text into machine-encoded text. We will be using here MODI algorithm of OCR.

Audio Module

This module will get the extracted text as an input and it will read out the text using Text To Speech available in the mobile. If no text is recognized then default audio output will be given. This will be done using SAPI libraries.

Fig-1: System Architecture

When user wants to read any object then he/she will be checking for internet connection is there or not. If internet connection is there in the mobile user should click on the camera button and capture the object photo which he wants to read. Then it immediately uploaded to OCR cloud for recognition and data extraction. Here image will be converted to text file. Then recognized data (.txt file) export to Read2Me application. Read2Me application sends data for speech synthesis. Now the text file is send to default android text to speech (TTS) engine. TTS engine outputs speech for the recognized text file. After all these process audio plays to the user through Read2Me application.

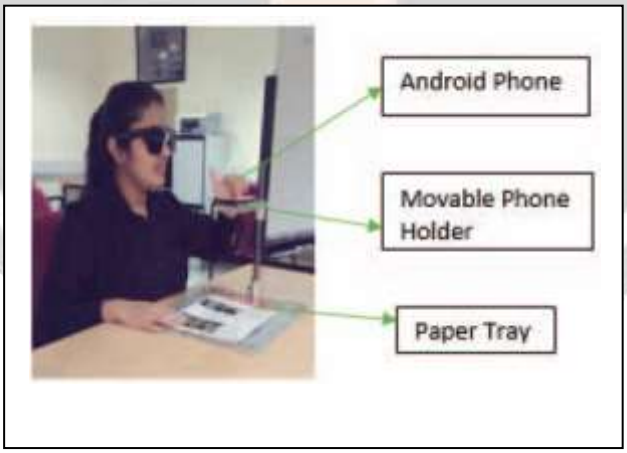

Fig -2: Snapshot of our demo system

4. CONCLUSION

We propose an assistive system to read printed text on objects for assisting visually impaired persons. To solve the common problems of blind people we have proposed a method in which the visually impaired people will click the image. This method can effectively separate the objects of interest from complex background and other objects in the camera view OCR is used to perform word recognition of the localised text regions and transform into audio

output for visually impaired people.

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