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Development of OCR system on android platforms to aid reading with a refreshable braille display in real time

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Abstract

Individuals with visual impairment are limited in terms of communication, interaction and personal autonomy due to the lack of literature in Braille which is mainly attributable to economic reasons. This paper proposes a reading system for visually impaired persons using a portable device. This work proposes and evaluates a combination of segmentation, feature extraction and machine learning techniques to achieve the best conversion of text to braille as quickly and accurately as possible. The experiments showed that the Central Moments extractor with Multi Layer Perceptron were the best combination for the OCR system developed with 99.86% accuracy and 99.93% specificity. Furthermore, we assess the portable device usability with elementary teachers and with teachers and students in an association of the blind. The results of this system can contribute to improved socialization between visually impaired persons and stimulate their intellectual health.

Keywords: Digital Image Processing; Optical Character Recognition; refreshable braille display; Visually impaired

1. Introduction

Visual impairment has various causes, among which are macular diseases [1] and uncorrected refractive error [2]. Khairallah et al. [3] pointed out that in 2010, there were a total of 32.4 million blind and 191 million visually impaired individuals worldwide, and cataracts were responsible for 10.8 million blind and 35.1 million visually impaired people. A research conducted by Stevens et al. [4] reported that between 1990 and 2010, there were two main categories related to visual impairment: blindness and low vision. The intellectual and professional performance of individuals with low or no vision is severely compromised without suitable tools to access information. Limited access to knowledge causes social, labor and educational exclusion. For these people, the simple act of reading a magazine, newspaper, or even study a technical book, is a extremely hard, and such individuals are segregated from growth opportunities and personal fulfillment.

There are several systems to aid blind people.

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