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Sinhala Text to Braille Transliteration using YOLO and Super Resolution

A dissertation by

Ms. Geethika Perera

Supervised by

Mr. Rathesan Sivaganalingam

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Abstract

There are a considerable number of visually impaired people (VIPs) in the world, yet most of the times they do not get the same opportunities or the privileges a sighted individual will have in almost any field. Reading is one such crucial privilege that VIPs don't get to enjoy a lot. This problem has been addressed to a certain extent in some developed countries through the advancement of technology. Yet it is not the case for most of the VIPs living in developing countries like Sri Lanka, due to several reasons like difference in braille systems, high costs, lack of technological literacy, etc. Even the very limited solutions available for such people are not very efficient or convenient to use.

Therefore, to address these identified limitations, this research has introduced a text to braille transliteration system for VIPs that allows them to capture a text image and get the corresponding tactile braille output for the text in that image. The proposed solution focuses on Sinhala language, which is considered a low-resource language. The solution has been implemented using a novel approach where the detection of Sinhala characters in images has been treated as an object detection task with the use of YOLO instead of a classification task.

The proposed system's initial implementation showed promising results, and subsequent improvements were made to create a minimum viable product. The final version of the system was evaluated through user testing with visually impaired individuals, who reported high levels of satisfaction. The results of this study demonstrate the effectiveness of the proposed solution in addressing the challenges faced by VIPs in accessing Sinhala text-based information and will be a valuable tool for improving their quality of life.

Keywords: Optical Character Recognition, Object Detection, Text to Braille Transliteration, Sinhala Braille, YOLO, Deep Learning

Subject Descriptors:

- Computing Methodologies → Document and Text Processing → Document Capture → Optical Character Recognition (OCR)
- Computing Methodologies → Image Processing and Computer Vision → Scene Analysis → Object Recognition
- Computing Milieux → Computers and Society → Social Issues → Assistive Technologies for Persons with Disabilities