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Translation of Sinhala Braille characters into Sinhala language using image processing techniques

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The Braille system is the most valuable and indispensable method that enables blind or visually impaired people to write and read through the concept of the Braille cell. Braille is a great help in bridging the written communication gap between the blind and braille-illiterate people. Also, written materials used by the visually impaired can only be read by those proficient in Braille, so there is no precise way for ordinary people to assist the visually impaired in written communication. This study aimed to develop a model for ordinary people who do not know the Sinhala Braille system to understand the Sinhala Braille. The image datasets of 55 Sinhala Braille characters were collected using a mobile phone camera to develop this model. All the input images were resized to 28X28 pixels during the preprocessing process. After, the images are binarized with local adaptive thresholding. Then, those images were subjected to procedures such as grayscale, histogram normalization, gaussian filter, threshold binarization, erosion, and dilation. Finally, the preprocessed images were fed into a well-trained Convolutional Neural Network model. The developed model tested for 55 Sinhala Braille characters with eight punctuation marks and achieved an overall accuracy of more than 97%. The model will be further developed as a simple mobile and web application to overcome the limitations of written communication between the blind and Braille illiterate sighted people in Sri Lankan society.

Keywords: Convolutional Neural Network, Image processing, Sinhala braille

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