

RECOGNITION OF BANGLA CHARACTERS FROM BRAILLE NOTATION USING CONVOLUTIONAL NEURAL NETWORKS

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ABSTRACT

In Bangladesh, the visually impaired people have limited access to formal education due to the unavailability of dedicated study materials written in the Braille System. As a consequence, this is widening a knowledge gap and inequality within a society where we believe education should be accessible to all, irrespective of religions, races, genders, and physical disabilities. An automated system for translating characters represented in Braille notation to their equivalent Bangla alphabets is much needed to facilitate interactions between normal people and the visually impaired ones. In this paper, we present an innovative technique for classifying the Bangla alphabets from Braille notation using Convolutional Neural Networks (CNNs). The model for the proposed system has achieved an F1 score of 0.98.

Keywords: Machine Learning, Character Recognition, Convolutional Neural Networks, Image Processing.

INTRODUCTION

Braille is a tactile writing system for the visually impaired people where characters are represented by patterns of raised dots that are perceived by fingertips. It is used by thousands of visually impaired people across the world as a means of obtaining formal education as well as employment. A Braille cell is represented by 6 dots arranged in two columns and three rows. Fig. 1 illustrates the numbered dot positions within a Braille cell. There are 64 possible combinations using one or more of these six dots. The combination with no dots represents space. A single Braille cell can be used to represent only one character.

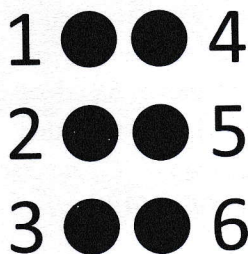


Fig. 1: Braille cell with numbered dot positions

This proposed system includes a mapper that maps a Bangla Braille alphabet to its corresponding Braille code. It's important to note that the same Braille cells as Bangla vowels represent the Bangla vowel signs. For example, both the vowel 'আ' and the equivalent vowel sign '।' are represented by the Braille code 001110 and the Braille dots 345.