

Intelligent Handwriting Recognition for Preschool Children Using Convolutional Neural Networks (CNNs)

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Abstract

This study addresses the challenge of recognizing handwritten numbers and alphabetic letters produced by preschool children. At this developmental stage, handwriting is often irregular, unstructured, and inconsistent in shape, size, and orientation, which makes accurate interpretation difficult for conventional automated recognition systems. To overcome these challenges, this research employs Convolutional Neural Networks (CNNs), a deep learning model well established for image classification tasks. The proposed CNN architecture is designed to manage the variability inherent in preschool handwriting while classifying numbers (0–9) and both uppercase and lowercase letters (A–Z, a–z). The objective is to develop a model capable of reliably identifying characters despite inconsistencies in handwriting. By facilitating more effective monitoring of literacy development, this system aims to provide valuable support to early childhood educators. Automating the recognition process enables teachers to identify students who may require additional assistance at an early stage, thereby promoting individualized instruction and timely intervention. Experimental results demonstrate that the proposed model achieves an accuracy of 86% in predicting alphabetic letters and numbers from preschool children’s handwriting. Ultimately, this research seeks to enhance early learning assessment by integrating artificial intelligence with education.

Keywords: Handwriting Recognition, Preschool, CNN, Deep Learning, Character Classification