

I. INTRODUCTION

In the digital era, image processing has become essential for improving the quality of images and enabling automatic object recognition. CNNs have emerged as a powerful technique for image classification, allowing the learning of hierarchical features that enhance accuracy. However, most existing studies focus on character recognition in general or non-Latin letters, with limited attention given to the unique challenges of children's handwriting.

The CNN can learn the hierarchical features used for image classification, in which the hierarchical approach is able to learn more complex features with higher layers, so that the accuracy of the CNN method for classifying images will be higher [1]. For handwriting recognition in literature, a lot of research has been done on the detection of letters or words that are part of a phrase or text [2]. However, this difficulty increases in complexity when considered in the context of young children beginning to write who have very precise handwriting. This section discusses several studies on letter recognition using CNN as a detection algorithm. In the development of studies related to character recognition, especially for non-Latin letters that have various and complex structures, some experts propose deep learning techniques with extraction and modelling features [3]. The paper in [4] has been presented a comparison of handwriting acquisition during training using digital and paper technologies.

The results show a significant increase in children who are trained to use paper media, especially in terms of fluency. Convolutional neural networks (CNN), which were employed in earlier studies on character recognition, are an example of a deep learning technique. For instance, A. Dutt and AashiDutt developed a handwritten number recognition system using a technique that, when put into operation, had a 99.70 percent accuracy rate [5]. However, the complexity of the code and the lengthier processing times frequently represent a significant limitation [6]. The widespread use of the non-slanted alphabet, which is complex, challenging to recognize, and different from the Roman alphabet, is another subject that is relevant to this topic [7]. For example, a report by Younis [8] focuses on identifying handwritten Arabic characters that use several data sets, resulting in an accuracy level of 94.6% through a total of 8748 AIA9K, each consists of 85% and 15% training and testing drawings, respectively.

The problem addressed in the text is the difficulty of accurately classifying children's handwriting in the form of letters. While there has been extensive research on letter recognition and image classification using Convolutional Neural Networks (CNNs), the specific challenge arises when considering the handwriting of young children with precise handwriting. The complexity of character structures, variations in non-Latin alphabets, and the need for high accuracy pose significant obstacles in accurately classifying children's handwriting.

The methodology employed is a Convolutional Neural Network (CNN) based quantitative descriptive approach. By leveraging deep learning techniques and feature extraction, the research aims to develop an optimized model to effectively interpret and classify children's handwritten letters. The goal of this research is to analysis of CNN optimizer for classification letter images with the intention of classifying children's handwriting in the form of letters.

The system's classification capabilities will contribute to enhancing handwriting recognition technologies, which can have various applications in educational tools, automated document processing, and other relevant domains.