Handwritten Modi Script Character Recognition Using CNN and VGG16 Algorithms

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Abstract: *Recognition of handwritten letters in ancient scripts is challenging because of differences in handwriting styles, noise, and complexity of cursive scripts. Modi script, an ancient cursive version of Marathi script, has seen almost complete oblivion of use but is of enormous cultural and historical significance. The implementation of a deep learning system based on convolutional neural networks (CNN) for handwritten Modi character recognition is described in this research and transfer learning using VGG16. Two datasets were employed for experimentation: a public handwritten Modi dataset from IEEE DataPort and a self-created dataset gathered from various individuals to inject writing diversity. The process involves pre-processing operations like noise removal, resizing, binarization, and character segmentation. The CNN model uses convolutional, pooling, and dense layers, whereas the VGG16 model uses pre-trained ImageNet weights and is fine-tuned for 46 Modi characters (vowels and consonants). Both models were trained and tested with accuracy, sensitivity, specificity, and F1-score measures. Experimental outcomes confirm that VGG16 performs better than the basic CNN model, with increased recognition accuracy, especially for characters with similar appearances. The system is highly generalizable across both datasets and performs well in character classification tasks in ancient scripts. This implementation fills an essential gap in digital heritage preservation and illustrates the need to use modern AI methods to revive and digitize culturally valuable scripts such as Modi. Future projects involve expanding the system to process linked handwritten text and trying out attention-based deep-learning architectures for better performance.*

Keywords: Modi Script, Handwritten Character Recognition, Convolutional Neural Network (CNN), VGG16, Transfer Learning, Deep Learning, Image Preprocessing, Ancient Script Digitization, Optical Character Recognition (OCR), Historical Document Analysis

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