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Bridging Heritage and Technology: A Review of Modi Script Character Recognition

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Abstract: *This paper provides a systematic review of advancements and challenges in Modi script character recognition, an ancient cursive script historically used in Maharashtra, India. The Modi script's unique features—its connected characters, cursive structure, and limited modern familiarity—pose significant challenges for Optical Character Recognition (OCR) and machine learning-based recognition methods. As there is a limited number of annotated datasets and variability in character styles, traditional image processing techniques, such as thresholding and edge detection, have seen limited success in this domain. However, recent advances in deep learning, especially Convolutional Neural Networks (CNNs) and hybrid models like CNN-SVM, have shown promising improvements in recognition accuracy and feature extraction, demonstrating their potential to handle the script's complexities. This review consolidates findings across various studies, focusing on the effectiveness and limitations of both conventional and modern methodologies. We highlight key trends, such as the shift toward transfer learning and hybrid models, which leverage multiple algorithmic strengths to overcome data scarcity and handwriting variability issues. Additionally, the review explores the potential of emerging techniques, including explainable AI, dataset augmentation, and cross-script recognition, to further enhance recognition outcomes. Our findings suggest that continued exploration of advanced methods, coupled with enhanced data resources, can play a pivotal role in the preservation and accessibility of Modi script texts. This paper contributes to the discourse on cultural heritage preservation through technology, offering valuable insights and future directions for researchers and technologists working on Modi character recognition and similar historical scripts.*

Keywords: Modi Character, Modi Lipi, Deep learning, CNN

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