INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: Exploration of Novel approaches for offline writer identification using handwritten words

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SHORT ABSTRACT

This thesis presents innovative approaches for offline handwritten word image author identification, leveraging various deep learning techniques. The first work employs feature maps from pre-trained CNN layers to capture writer-specific characteristics. Key-point regions are first detected using the SIFT algorithm across different abstractions like characters and their combinations. These regions are processed through a CNN, producing feature maps that are then represented using a modified HOG feature descriptor. A unique contribution lies in extracting additional cues from these feature maps through a saliency measure derived using Sparse Principal Component Analysis (SPCA). The saliency scores are integrated with HOG features to create customized descriptors, which are then classified using SVMs to determine the identity of the writer.

The second work further explores writer identification using a Siamese neural network with a residual framework, introducing a sparse-based model for feature reduction. A novel divergence-based technique is proposed to assign saliency scores to features, enhancing the discriminatory power of the network. The third work proposes a multi-stream CNN framework that captures both writer-specific and global features through two parallel modules—one writer-dependent and one writer-independent. An attention mechanism is incorporated to improve the representation power by focusing on crucial regions within fragments. The efficacy of these methods is validated using three public datasets: IAM, CVL, and CERUG-EN, showing promising results compared to existing techniques.