**Artificial Intelligence and Machine Learning**

Project Report

Semester-IV (Batch-2022)

Handwriting OCR

A red and white sign

Description automatically generated with low confidence

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ABSTRACT

This project is dedicated to the development of a robust handwriting recognition system, leveraging TensorFlow, PyTorch, and Keras. The DataProvider object orchestrates crucial transformations, including image reading, resizing, label indexing, and padding. The dataset undergoes meticulous preprocessing, including a strategic split into training and validation sets, augmented by diverse techniques to enhance model robustness.

The model architecture integrates convolutional, max-pooling, and bidirectional LSTM layers, strategically designed for effective feature extraction and character relationship capture. The training process employs CTC loss and the Adam optimizer, facilitating the model's proficiency in handling variable input-output sequences without strict alignment constraints.

Evaluation metrics center on the Character Word Error Rate (CWER), offering insights into the model's character-level accuracy. TensorBoard visualizations reveal nuances in the training process, with occasional spikes in the Character Error Rate (CER). Recommendations for improvement include fine-tuning on a more extensive or similar dataset, adjusting model size, and exploring alternative optimizers and learning rate schedules.

Beyond the technical intricacies, this project holds substantial implications for real-world applications. The developed handwriting recognition system can contribute significantly to fields such as document digitization, accessibility improvements for individuals with motor impairments, and broader advancements in optical character recognition. The intricate interplay of TensorFlow, PyTorch, and Keras in this handwriting recognition framework establishes a foundation for ongoing advancements and refinements in the evolving landscape of handwritten character recognition with tangible societal impacts.