**A Novel Method for Handwritten Digit Recognition System**

**Abstract**

Handwritten digit recognition is a crucial problem in computer vision and pattern recognition, with applications in postal code recognition, bank check processing, and digit-based authentication. A novel approach, the Handwritten Digit Recognition GAN (HDR-GAN), combines the power of discriminative and generative models for enhanced recognition accuracy. The HDR-GAN consists of a generator and a discriminator, trained to synthesize realistic handwritten digit images and differentiate between real and generated digits. The two-step process involves generating a diverse set of synthetic samples to augment the training dataset and using the generator as a pre-processing step for real-world handwritten digit images. Experimental results on benchmark datasets like MNIST and USPS show that the HDR-GAN significantly improves recognition accuracy compared to traditional methods. It also exhibits remarkable robustness when dealing with noisy or distorted handwritten characters, making it suitable for practical applications. The proposed method offers a promising solution for various real-world applications requiring accurate digit recognition.

**Technology Stack:**

· Python

· Anaconda

· Jupyter