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Revolutionizing Digit Image Recognition: Pushing the Limits with Simple CNN and Challenging Image Augmentation Techniques on MNIST

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Abstract
This study aims to apply Convolutional Neural Networks (CNN) and image augmentation techniques in digit recognition using the MNIST dataset. We built a CNN model and experimented with various image augmentation techniques to improve digit recognition accuracy. The results showed that the use of CNN with image augmentation techniques was effective in improving digit recognition performance. In the data collection stage, we used the MNIST dataset consisting of images of handwritten digits as training and testing data. After building the CNN model, we apply image augmentation techniques such as rotation, shift, and flipping to the training data to enrich the data variety and prevent overfitting. The evaluation results show that the CNN model that has been trained with image augmentation techniques produces significant accuracy, with a maximum accuracy of 99.81%. We also performed an ensemble of several CNN models and found that this approach increased the digit recognition accuracy to 99.79%. This research has the potential for further development. Recommendations for further research include exploring more specific and complex image augmentation techniques, as well as using more challenging datasets. In addition, future research may consider improvements to the CNN architecture used or combining it with other methods such as recurrent neural networks (RNN). © 2023, Bright Publisher. All rights reserved.

Author Keywords
Convolutional Neural Networks (CNN); Digit Image Recognition; Image Augmentation

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