Klasifikasi Tulisan Tangan Aksara Sunda Menggunakan Ekstraksi Ciri LBP dan Algoritma Convolutional Neural Network

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ABSTRAK

Aksara Sunda, representasi visual bahasa Sunda, telah mengalami penurunan penggunaan tetapi tetap menjadi bagian penting dari budaya Suku Sunda (Nurwansyah, 2015). Dalam era digital, diperlukan integrasi dan promosi Aksara Sunda melalui teknologi canggih. Penelitian ini mengusulkan klasifikasi tulisan tangan Aksara Sunda dengan mengkombinasikan Local Binary Pattern (LBP) dan Convolutional Neural Network (CNN). LBP efektif dalam ekstraksi tekstur, dan CNN unggul dalam pengenalan pola, diharapkan dapat menciptakan model klasifikasi yang akurat dan efisien.

Dataset terdiri dari 1.600 gambar tulisan tangan Aksara Sunda dalam 40 kelas. Persiapan data meliputi resizing, konversi grayscale, thresholding, penghapusan noise dan grid, identifikasi kontur, ekstraksi region grid, pemotongan gambar, pelabelan data, dan augmentasi data. Model CNN dilatih dengan dan tanpa LBP selama 30 epoch dengan early stopping memonitor 'val_accuracy' dan 'val_loss'. Hasil evaluasi menunjukkan model CNN tanpa LBP mencapai akurasi 92.11% dengan loss 0.7429, sedangkan model dengan LBP mencapai akurasi 71.21%. Confusion matrix dan classification report menunjukkan model tanpa LBP lebih baik dalam mengenali kelas Aksara Sunda. Hypertuning parameter dilakukan untuk performa optimal, meskipun model tanpa LBP menunjukkan performa terbaik, hypertuning tetap penting.

Penelitian ini menunjukkan bahwa meskipun LBP membantu dalam mengidentifikasi tekstur dan pola, model tanpa LBP lebih unggul dalam akurasi. Penelitian ini bertujuan mengembangkan solusi teknologi untuk mempromosikan dan melestarikan Aksara Sunda di era digital serta memberikan kontribusi signifikan pada literatur ilmiah dalam bidang pengenalan pola dan teknologi informasi.

Kata Kunci: Aksara Sunda, *Convolutional Neural Network*, *Local Binary Pattern*, Klasifikasi Tulisan Tangan, *Hypertuning Parameter*

Classification of Sundanese Handwriting Using LBP Feature Extraction and Convolutional Neural Network Algorithm

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ABSTRACT

The Sundanese script, a visual representation of the Sundanese language, has declined in use but remains a vital part of Sundanese cultural heritage (Nurwansyah, 2015). In the digital era, there is a need to integrate and promote the Sundanese script through advanced technology. This study proposes an innovative approach to classify handwritten Sundanese script by combining Local Binary Pattern (LBP) and Convolutional Neural Network (CNN). LBP is effective in texture extraction, and CNN excels in pattern recognition, expected to create an accurate and efficient classification model.

The dataset consists of 1,600 images of handwritten Sundanese script in 40 classes. Data preparation includes resizing, grayscale conversion, thresholding, noise and grid removal, contour identification, region grid extraction, image cropping, data labeling, and data augmentation. The CNN model was trained with and without LBP for 30 epochs using early stopping monitoring 'val_accuracy' and 'val_loss'. Evaluation results show that the CNN model without LBP achieved 92.11% accuracy with a loss of 0.7429, while the model with LBP achieved 71.21% accuracy. The confusion matrix and classification report indicate that the model without LBP performs better in recognizing Sundanese script classes. Hypertuning parameters were conducted for optimal performance, showing that although the model without LBP showed the best performance, hypertuning remains essential.

This research demonstrates that while LBP aids in identifying textures and patterns, models without LBP are superior in accuracy. This study aims to develop technological solutions to promote and preserve the Sundanese script in the digital era and significantly contribute to the scientific literature in pattern recognition and information technology.

Keywords: Sundanese Script, Convolutional Neural Network, Local Binary Pattern, Handwriting Classification, Hypertuning Parameter