ABSTRACT

The Keraton Yogyakarta batik patterns are part of Indonesia's cultural heritage, which carries deep philosophical values. The manual identification of these patterns presents several challenges, including limited public knowledge and the need for specific expertise to recognize their visual characteristics. This study aims to develop an automatic classification model for Keraton Yogyakarta batik patterns by using a Convolutional Neural Network (CNN), with hyperparameter optimization applied through the Particle Swarm Optimization (PSO) algorithm. Previous studies have demonstrated that PSO is effective for optimizing CNN hyperparameters in classification tasks, due to its efficient search process and fast convergence. The CNN model employs the AlexNet architecture, while PSO is utilized to find the optimal configuration of dropout rate, learning rate, activation function, and optimizer type. Performance evaluation is conducted using cross-validation and confusion matrix analysis. The results demonstrate that classification accuracy improved from 70% before optimization to 95% after applying PSO. The optimal configuration includes a dropout rate of 10%, learning rate of 0,01, ReLu activation function, and SGD (Stochastic Gradient Descent) optimizer. Testing on new data yielded an accuracy of 98.3%, precision of 98.41%, and sensitivity of 98.33%. These findings indicate that the integration of CNN and PSO effectively enhances the accuracy of batik motif image classification and has potential applications in visual identification systems based on imagery to support the digital and sustainable preservation of local cultural heritage.

Keywords: Keraton Yogyakarta Batik Patterns, Image Classification, CNN-PSO