PROJECT REPORT

MUSHROOM CLASSIFICATION WITH A HYBRID CNN – SVM ALGORITHM

ABHINAYA SHEVA DJATMIKA
21.K1.0057

Faculty of Computer Science
Soegijapranata Catholic University
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ABSTRACT

Mushroom classification is a challenging task due to the vast variety of species and their visual similarities. To address this, this study implements a Hybrid CNN-SVM model, where CNN (VGG16) is used for feature extraction and SVM serves as the final classifier. The goal is to compare the performance of this hybrid approach against a standalone CNN model, evaluating how different dataset preprocessing methods and SVM kernels affect classification accuracy. Experiments were conducted using cropped and uncropped datasets, with varying train-test splits (70%-30%, 80%-20%, and 90%-10%). The results showed that the uncropped dataset consistently outperformed the cropped dataset, indicating that background information plays a role in feature extraction. The Hybrid CNN-SVM model with the RBF kernel achieved the highest accuracy of 90% with a 70%-30% split, followed by 89% with an 80%-20% split, and 89% with a 90%-10% split. These results demonstrate that a larger training set does not always guarantee better accuracy, as a balanced dataset split can provide more reliable generalization. In comparison, the Full CNN model exhibited more variability and lower accuracy across different splits. Additionally, the RBF kernel outperformed the Linear kernel, confirming that non-linear decision boundaries are more effective for high-dimensional CNN-extracted features. Future studies can explore alternative preprocessing techniques, different CNN architectures, and SVM hyperparameter tuning to further enhance classification performance.

Keyword: cnn, svm, classification, mushroom