

ABSTRAK

Lumpy Skin Disease (LSD) adalah penyakit menular pada ternak sapi yang disebabkan oleh virus *Capripoxvirus*. Identifikasi dini LSD masih dilakukan secara manual oleh para ahli dan memerlukan waktu 12-21 hari, yang dapat menyebabkan dampak ekonomi pada sektor peternakan, seperti penurunan harga hewan, kematian dan keguguran, serta penurunan produksi susu. Penelitian ini mengembangkan model klasifikasi LSD menggunakan algoritma *Random Forest* , baik dengan maupun tanpa optimasi *Hyperparameter* menggunakan *Random Search*, untuk mempercepat proses identifikasi dan membantu mengurangi dampak ekonomi. *Dataset* berjumlah 24.803 sampel dari *Mendeley Dataset*, 21.764 sampel *No lumpy* dan 3.039 sampel *Lumpy*. Untuk menangani ketidakseimbangan kelas, diterapkan teknik *Resampling Synthetic Minority Over-sampling Technique (SMOTE)* dan *Random Undersampling (RUS)*. Model dievaluasi menggunakan metrik *Area Under the Curve (AUC)*, *accuracy*, *Precision*, *Recall*, dan *F1-score*. Hasil menunjukkan bahwa model *Random Forest* tanpa *Hyperparameter tuning* dengan RUS menghasilkan akurasi 94,53%, *Precision* 85%, *Recall* 94%, dan *F1-score* 89%, ROC-AUC 0.98. Setelah *tuning*, menghasilkan akurasi sebesar 94,56%, sementara *Precision* 85%, *Recall* 94%, dan *F1-score* 89%, ROC-AUC 0.98. Dan pada hasil model *Random Forest* tanpa *Hyperparameter tuning* dengan SMOTE menghasilkan akurasi 96,30%, *Precision* 90%, *Recall* 94%, dan *F1-score* 92%, ROC-AUC 0.98. Setelah *tuning*, menghasilkan akurasi sebesar 96,35%, sementara *Precision* 90%, *Recall* 94%, dan *F1-score* 92%, ROC-AUC 0.98.

Kata Kunci: Evaluasi Model, Klasifikasi, *Lumpy Skin Disease*, *Random Forest* , *Random Search*, SMOTE

ABSTRACT

Lumpy Skin Disease (LSD) is a contagious disease in cattle caused by the Capripoxvirus. Early identification of LSD is still performed manually by experts and requires 12–21 days, which can lead to economic impacts on the livestock sector, such as decreased livestock prices, mortality and miscarriages, as well as reduced milk production. This study develops an LSD classification model using the Random Forest algorithm, both with and without Hyperparameter optimization using Random Search, to accelerate the identification process and help reduce economic impacts. The dataset consists of 24,803 samples from Mendeley Dataset, including 21,764 "No Lumpy" samples and 3,039 "Lumpy" samples. To address class imbalance, the Synthetic Minority Over-sampling Technique (SMOTE) and Random Undersampling (RUS) methods were applied. The model was evaluated using the metrics Area Under the Curve (AUC), accuracy, precision, recall, and F1-score. The results show that the Random Forest model without Hyperparameter tuning using RUS achieved an accuracy of 94.53%, precision of 85%, recall of 94%, F1-score of 89%, and ROC-AUC of 0.98. After tuning, the model achieved an accuracy of 94.56%, with precision of 85%, recall of 94%, F1-score of 89%, and ROC-AUC of 0.98. Meanwhile, the Random Forest model without Hyperparameter tuning using SMOTE achieved an accuracy of 96.30%, precision of 90%, recall of 94%, F1-score of 92%, and ROC-AUC of 0.98. After tuning, the model achieved an accuracy of 96.35%, with precision of 90%, recall of 94%, F1-score of 92%, and ROC-AUC of 0.98.

Keywords: *Classification, Evaluation Model, Lumpy Skin Disease, Random Forest, Random Search, SMOTE.*