

## **CHAPTER V**

### **CONCLUSION**

This chapter summarizes the research conclusions derived from the evaluation results of model testing and the implementation of the Android application. In addition, suggestions are provided as recommendations for future studies in order to achieve more optimal results.

#### **5.1 Conclusions**

According to the research results, the InceptionV3-CBAM method has been successfully applied to image-based detection of Foot-and-Mouth Disease (FMD) in cattle, demonstrating excellent performance. The evaluation results using 5-Fold Cross Validation (k=5) showed that the baseline configuration achieved an average accuracy of 97.17% with a standard deviation of 0.0099. Meanwhile, the model resulting from hyperparameter optimization using Bayesian Optimization achieved a mean accuracy of 97.50% and a standard deviation of 0.0063. Furthermore, the high precision, recall, and F1-score demonstrate that the model accurately and consistently classifies FMD and healthy images. This addresses the first research problem statement that the InceptionV3-CBAM method can be used effectively for image-based FMD detection.

The implementation of Bayesian Optimization has proven to significantly improve model performance compared to the baseline hyperparameters. The optimization results yielded a better hyperparameter combination, thereby increasing accuracy by 0.33% and improving precision, recall, and F1-score. In addition, the optimized configuration in the 5th fold produced the highest performance results with \*superior accuracy and \*a stable training curve, and was therefore selected as the final model. This answers the second research problem statement: Bayesian Optimization positively influences the overall performance of the InceptionV3-CBAM model.

The selected model obtained was then successfully implemented into an Android-based detection system, enabling practical detection of FMD through cattle images. This implementation demonstrates that the model can serve as an assistive system for early-stage detection of FMD in the field. Thus, this research has successfully achieved its main objective: to develop an image-based FMD detection model using InceptionV3-CBAM with Bayesian Optimization and implement it in a mobile application.

## **5.2 Suggestions**

Based on the findings obtained from this research, several recommendations for future studies are as follows:

1. Future research is recommended to use a larger dataset with more diverse field conditions so that overall model performance and generalization capability may be improved further.
2. Subsequent development can focus on object detection-based models (for example, YOLOv8 or Faster R-CNN) so that the system can simultaneously detect and automatically mark the location of FMD lesions.
3. The application implementation can be further developed with a cloud system or database integration, allowing detection results to be stored and used for continuous livestock health monitoring.