CHAPTER V
CONCLUSION

5.1 Conclusion

Based on this research on the creation of a rice leaf disease classification model using MobileNetV3-Large with the explainable AI Grad-CAM approach, the following conclusions were obtained:

1. The rice disease classification model using MobileNetV3-Large was trained using 10 test scenarios. Of the ten test scenarios, three models performed best in each data sharing scenario. The three models were compared again based on validation accuracy and F1-Score parameters, resulting in the best model using a 90:10 data ratio, a 0.0005 learning rate, the Adam optimizer, and 30 epochs. The best scenario shows that the model with a higher data ratio provides the model with more opportunities to learn from data, enabling it to recognize data in various input variations. In addition, a lower learning rate helps the model perform transfer learning compared to a higher learning rate.
2. Once the best model was obtained, the Grad-CAM method was applied to the model to visualize how the model thinks when determining classification classes. Quantitative testing on a sample dataset revealed that the model largely determined classification classes based on disease symptoms on the leaves. This suggests the model utilizes symptoms or features that represent disease symptoms.
3. The model and Grad-CAM were deployed as a mobile app to assist users. Based on system testing, the app performed well, and the classification model and Grad-CAM also performed well.

5.2 Future Work Suggestions

Based on the research results and conclusions obtained in this study, a number of suggestions were obtained which were used for further research development:

1. The model and Grad-CAM are deployed in a model application using a client-server architecture because mobile machine learning libraries do not support gradient computation. This impacts the application's use outside of an internet connection. This research suggests exploring alternative gradient-free heatmap-based XAI alternatives, such as Score-CAM, so the entire application can run offline.

2. If the gradient-free XAI method is too heavy to run on a mobile device because it needs to process many channels, an optimization method can be applied so that it runs faster, such as using channel pruning so that the number of channels processed is smaller and speeds up the computation.
3. Training with a larger number of datasets. This study only used 6,120 datasets, but the MobileNetV3-Large model is capable of absorbing more data, and the greater variety of data helps the model when faced with real-world input.
4. Future work should include capability for the model to distinguish between non-rice leaf image and rice leaf image.