

CHAPTER V

CONCLUSION AND SUGGESTIONS

5.1. Conclusion

From the research that has been carried out, the following conclusions can be obtained:

1. The implementation of the combination of MSTHGR as a method of improving image quality and VGG-19 as a classification model is carried out through several stages such as data collection, data preprocessing, model implementation, model training, model testing, and model evaluation. In the data preprocessing stage, several types of preprocessing are used, namely grayscale conversion, MSTHGR implementation, RGB conversion, data split, data augmentation, and pixel normalization. The implementation of MSTHGR is carried out as one of the stages in data preprocessing to improve local contrast and sharpen structural details in the image. In the testing process using the VGG-19 model, five hyperparameter scenarios were tested such as *learning rate*, *epoch*, *batch size*, *dropout rate*, and *split data* to find the best combination of hyperparameters.
2. Based on the tests that have been carried out, the combined MSTHGR and VGG-19 methods are able to classify the severity of osteoarthritis with a fairly good performance with a test accuracy performance of 0.6185 and a macro F1-score of 0.6652. Nonetheless, the results of the comparison with the comparator model showed that the implementation of MSTHGR did not improve the test accuracy compared to the VGG-19 model without MSTHGR. The effect of MSTHGR itself is selective, where this method is only able to increase the classification performance in the osteoarthritis class with high severity, but decreases the performance in the normal class and does not provide significant performance changes in the other classes. Thus, the combination of MSTHGR and VGG-19 is quite effective in helping the classification of osteoarthritis especially in osteoarthritis with high severity, but it has not been able to improve the accuracy of the model testing.

5.2. Suggestions

Based on the research that has been conducted, the combined MSTHGR and VGG-19 methods have not been able to show a significant increase in performance compared to regular VGG-19. Thus, the next study is recommended to conduct a deeper optimization of the parameters of the MSTHGR so that the enhancement method can have a better influence. It is also recommended to add other pre-processing stages such as noise reduction and segmentation of the knee joint area to help highlight important features. In addition, it is also recommended to use a dataset with a more balanced distribution of the amount of data in each class so that the model is able to obtain information from each class more evenly and improve the stability of model performance across all osteoarthritis severity levels.