

## CHAPTER V

### CONCLUSION AND RECOMMENDATION

This chapter presents the essence of the entire research workflow undertaken, comprising the definitive conclusions derived from the study alongside strategic recommendations for prospective future studies. The concluding points are formulated systematically by referencing empirical observations, model evaluation phases, and comprehensive discussions articulated in the preceding chapters to directly address the research problem defined at the outset of this study. Through this exposition, readers are provided with a comprehensive understanding of the operational workflow and the specific milestones achieved. Furthermore, the accompanying recommendations are intended as scholarly contributions to serve as a baseline or reference framework for other researchers in optimizing the development of similar computational systems.

#### **5.1. Conclusion**

Based on the comprehensive system evaluations and experimental results, the following conclusions are presented to directly address the research objectives established at the beginning of this study:

1. The utilization of the MobileNetV3-Small architecture proves highly effective in serving as an automated feature extractor for handwritten Javanese script characters. The architectural strategy of truncating the dense top classification layers and incorporating GAP allows the framework to smoothly reduce the dimensional space of the 224 x 224 pixel input images into compact numerical feature vectors that remain rich in structural and morphological information. Furthermore, this model provides a distinct advantage in computational efficiency, making it highly suitable for integration into web-based deployment platforms that require rapid real-time response latency.
2. MobileNet-SVM algorithm demonstrates impressive performance in classifying the 20 distinct categories of Javanese script characters. When evaluated using a Linear kernel function paired with a soft-margin regularization constant of  $C = 0.1$ , the framework achieves a peak global classification accuracy floor of 98.14% under the CLAHE preprocessing matrix. These outcomes demonstrate that the combination of deep architectural feature descriptors from MobileNetV3 and the

optimal margin-separation boundaries of the SVM is highly effective. This remains true despite minor classification challenges localized among character pairs with high visual and typographic similarity.

3. The pre-trained machine learning architecture was successfully deployed into a functional, practical application named *SinauAksara* utilizing the Flask micro-framework. This implementation encompasses the complete end-to-end digital processing workflow, ranging from managing binary user image uploads, executing digital image preprocessing routines via OpenCV to executing real-time predictive inference. The deployment of this platform proves that artificial intelligence can serve as an interactive educational bridge.

## **5.2. Recommendation**

Based on the empirical findings and operational constraints identified throughout this research, the following recommendations are put forward to guide prospective future developments:

1. It is highly recommended to expand the volume of training instances specifically for Javanese character pairs that display highly similar structural and geometric typographies. Incorporating a wider variety of handwritten stroke variations from a diverse pool of respondents will assist the SVM classifier in computing a more robust separating hyperplane. This data expansion will significantly enhance the class-specific recall metrics among categories that remain susceptible.
2. Given that the integration of the CLAHE technique demonstrates a clear capacity to enhance digital image quality and model performance metrics, prospective studies should explore with alternative preprocessing pipelines. These include spatial filtering, edge detection, and advanced image segmentation algorithms. Additionally, future research could explore alternative feature extraction, such as EfficientNet or ResNet architectures, to systematically cross-evaluate performance and achieve more optimal classification thresholds.
3. The *SinauAksara* web platform can be scaled up by integrating sentence-level OCR systems. This development would expand the application's capabilities to transliterating full lines of Javanese script text concurrently. Introducing automated audio pronunciation modules and interactive visual feedback regarding stroke accuracy would greatly enhance the application's pedagogical value.