

ABSTRACT

*This research focuses on the development of an efficient and accurate automated system for sorting the gender of mice (*Mus musculus*) using computer vision technology with the implementation of the You Only Look Once (YOLO) algorithm. The background of this study is the need to minimize physical contact between humans and mice in farm and laboratory environments, which aims to reduce the risk of zoonotic disease transmission and increase efficiency in laboratory animal population management. The developed system is designed to replace risky manual sorting methods that require strict protocols. The main objective of this research is to build a reliable object detection model for the automatic classification of mouse gender, while also supporting animal welfare principles. The model was trained using the transfer learning method with a dataset that has undergone annotation, preprocessing, and augmentation to improve generalization. The results of quantitative testing show a very high model performance, with a mean Average Precision (mAP@0.5) reaching 99.5%. Further analysis using a confusion matrix on 1,000 test data points recorded only one classification error, where the other 999 data points were detected correctly. In terms of speed, this system demonstrates the capability for real-time applications with an average inference time of 19.12 ms per frame. This performance confirms that the developed system is not only accurate but also fast enough to be implemented in a live mouse sorting workflow, providing an effective technological solution for challenges in the fields of animal husbandry and biomedical research.*

Keywords: deep learning, classification, mouse sex