



UNDERGRADUATE THESIS

IMPLEMENTATION OF YOLOv8 DEEP LEARNING FOR THE DETECTION OF ABNORMALITIES IN THE SHAPE OF BOVINE SPERMATOZOAN HEADS

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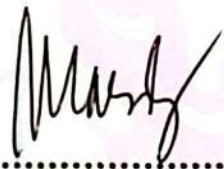
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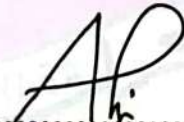
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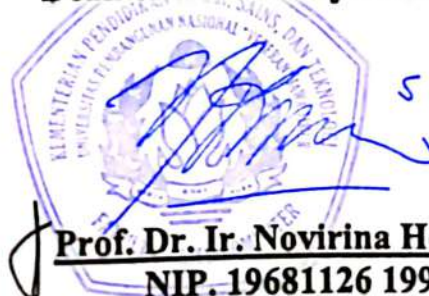
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STATEMENT OF ORIGINALITY

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Hereby declares that this undergraduate thesis contains no part of any other scientific work that has been submitted to obtain an academic degree at any higher education institution. Furthermore, it does not contain any work or opinions previously written or published by others, except for those which are explicitly cited in this thesis and listed completely in references.

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ABSTRACT

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Thesis Title : Implementation of Deep Learning Using YOLOv8 for the Detection of Bovine Spermatozoa Head Shape Abnormalities

Advisor : 1. Dr. Ir. I Gede Susrama Mas Diyasa, ST. MT. IPU
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Abnormalities in bovine sperm head morphology are among the factors that reduce semen quality and affect reproductive success. Manual identification is time-consuming and highly dependent on the examiner's expertise, highlighting the need for an automated detection approach. This study aims to implement the You Only Look Once version 8 (YOLOv8) architecture for detecting abnormalities in bovine sperm head morphology. Before model training, the images were preprocessed using Contrast Limited Adaptive Histogram Equalization (CLAHE) to enhance image contrast. The model was trained and evaluated using 27 experimental scenarios, consisting of three optimizers (SGD, Adam, and RMSProp), three learning rates (0.0001, 0.001, and 0.01), and three epoch settings (75, 100, and 125). The best performance was achieved using the RMSProp optimizer with a learning rate of 0.01 and 75 epochs. This configuration achieved an accuracy of 95.56%, mAP@0.5 of 91.76%, precision of 89.81%, recall of 88.38%, and an F1-score of 89.08%. These results demonstrate that YOLOv8 can effectively detect abnormalities in bovine sperm head morphology and has the potential to support automated semen quality evaluation.

Keywords: YOLOv8, CLAHE, bovine spermatozoa, sperm head abnormality, object detection.

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Author

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