Study and Application of YOLOv8 in Blood Cell Image Classification

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***Abstract*—This thesis explores the application of YOLOv8 in classifying blood cell images. The author gained new knowledge in machine learning, particularly in Convolutional Neural Networks (CNN) and the YOLO model, and developed a complete machine learning model. The work involved training and predicting using the YOLOv8 model, and the author faced challenges such as limited computational resources, which affected the training process. The thesis provides insights into the development and implementation of a machine learning model for blood cell image classification, highlighting the limitations and future directions for improvement.**

***Index Terms*—YOLOv8, blood cell image classification, machine learning, Convolutional Neural Networks, artificial intelligence**

I. Introduction

The thesis provides an overview of artificial intelligence, machine learning, and deep learning, focusing on Convolutional Neural Networks (CNN) and the YOLO model. The author learned about the steps in machine learning, deep learning frameworks, and activation functions, and applied these concepts to develop a machine learning model for blood cell image classification. The author faced challenges such as limited computational resources, which affected the training process. The work involved setting up the model and training it with a dataset, and the author discussed the challenges and limitations encountered during the development process [1]. Earlier ICTU student work on related designs is included here for context [3], [4]. Related published studies provide context for the subject and methods [5], [6], [7], [8], [9], [10]. These contextual works were selected for this English summary; they are not asserted to appear in the original thesis bibliography.

II. Methods

The author used the YOLOv8 model to train and predict blood cell images. The training process involved setting up the model and training it with a dataset. The prediction process involved loading the trained model and applying it to new images to detect and classify blood cells. The author faced challenges due to limited computational resources, which affected the training process. The author also discussed the challenges and limitations encountered during the development process, including the need for more data to improve the model's accuracy [1].

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III. Results

The author developed a machine learning model for blood cell image classification using YOLOv8. However, due to limited computational resources, the model was not fully tested on multiple architectures, and the training process was interrupted by memory overflow issues. The author provided a detailed description of the implementation process, including the setup of the model and the training process, but did not report any measured evaluation or test results [1].

IV. Discussion

The author discussed the challenges faced during the development of the machine learning model, including limited computational resources and the need for more data to improve the model's accuracy. The author also mentioned the need to continue researching and improving the model in the future. The author highlighted the limitations of the current implementation and the need for further work to address these limitations [1].

V. Conclusion

The author concluded that the project provided valuable knowledge in machine learning and deep learning, particularly in the application of YOLOv8 for blood cell image classification. The author plans to continue researching and improving the model in the future. The author emphasized the need for further work to address the limitations of the current implementation. The source describes memory shortages that prolonged or interrupted training and prevented a comparison across more model architectures [1].

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