AI for Environmental Stewardship: Automated Wildlife Detection to Support Wildlife Monitoring in Mining Areas

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# ABSTRACT

As the mining industry faces growing demands for environmental responsibility, effective wildlife and biodiversity monitoring has become a critical aspect of regulatory compliance and sustainability. Traditional wildlife monitoring methods, such as manual surveys and camera traps, can be time-consuming, resource-intensive, and often provide limited coverage. In response, this paper explores the potential of AI-based wildlife detection systems to automate and improve the monitoring of fauna in and around mine sites.

Using a collection of colour images of Australian wildlife, we have refined the ‘Ultralytics YOLOv5’ object detection computer vision model to be capable of detecting and classifying a subset of Australian species. Images were split into training, testing and validation sets and manually tagged with instances of wildlife, which the YOLO model can then then use to train to improve its detections. Of particular interest is how well the model performs under different environmental conditions, noting that Australian mine sites are present across many different biomes. The impact of lighting conditions was also evaluated however insufficient variation was achieved in the training set to draw true conclusions.

We propose that such AI-driven systems could offer mining operators a more efficient and scalable way to monitor wildlife in real time, enabling earlier detection of disturbances or habitat changes. This proactive approach could help guide mitigation strategies, such as setting up wildlife corridors, exclusion zones, or other protective measures, thereby minimising ecological impacts. This method could also be used more defensively to minimise operation/wildlife interactions in areas such as access roads. Furthermore, this method could be used to assist with regulatory reporting as it provides more accurate and consistent data than manual methods.

Overall, these findings highlight the potential for integrating AI solutions into our mining operations as part of our environmental stewardship duties and responsibilities. It allows for confirmation that industry activities align with sustainability goals, while also improving operational efficiency.