

Master internship proposal 2025

Detection of wild animals in zoo enclosure using thermal cameras and deep learning

Supervision : Dr. Thomas Josso-Laurain, Dr. Maxime Devanne

Duration : 6 months (beg. February -> end July 2025)

Gratification : 573.50 € per month

Keywords : deep learning ; wild animal ; RGB camera ; thermal camera

Research context :

Nowadays, zoo enclosures are becoming closer to natural biotopes of wildlife animals. This implies large enclosures with biological elements such as plants and trees, and landscape elements such as rocks, hills and so on. If these new ways of designing enclosures are really improving the wellness of the hosted animals, however these ones can become hardly visible. This implies two problems :

- Frustration of visitors who want to see animals
- Difficulties for the zookeeper staff to observe the animal

Particularly, this last issue can cause a) difficulties to observe an abnormal behavior of an animal, which can delay veterinary heals if necessary and b) accident if the zookeeper has to enter into an enclosure without a clear view of the animal.

To cope those problems, cameras can be installed around or inside the enclosures to monitor the animals in real-time [1]. Particularly, thermal cameras have been proved to be very efficient in enclosures with large number of plants or even during night-time [2], [3].

The goal of this internship is to use multi-camera setup and data fusion to detect animals using deep learning techniques such as CNNs [4] or YOLO [5].

Objectifs :

The intern will have to first review the existing literature based on articles and surveys [6] about zoo animal monitoring. Then, the goal is to select and purchase cameras (RGB, thermal, other modalities) according to the state-of-the-art, and to settle them with the help of the staff of the Mulhouse Zoo. In parallel, finding in the literature neural networks such as YOLO able to create a bounding-box prediction of the position of the animal in an image. The training of the neural network can be done using databases such as DeepFaune [7]. Finally, data fusion can be explored to enhance the performance of the neural networks by coupling RGB and thermal predictions. GPU-based architectures will be used with Python programming.

Work conditions :

The internship will take place at IRIMAS lab, in the MIAM team (Modélisation Identification Automatique et Mécanique) of the Université de Haute Alsace, Mulhouse (France). The intern will have to work on-field at the Zoo of Mulhouse, for camera settings or for image acquisition for instance. This internship is founded by the ANR.



Example of the Boreal Lynx at the Zoo of Mulhouse, used to climb up trees and therefore hardly visible

Expected profile : Final-year student in Master 2 / Engineering school (BAC+5), with an Artificial Intelligence / Computer Vision background. Good programming skills are expected (C, C++, Python). A first experience with camera acquisition, particularly thermal images, is good.

For any other information, or to apply, please send CV, M2 results and motivation letters. For administrative reasons, only applications from students already involved in a French university will be considered. As soon as a candidate matches the topic, the recruitment will be closed.

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References :

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