



AI in Veterinary Medicine: Improving Animal Health and Welfare

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Progress report

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The scope of the Project

This research project focuses on the preprocessing of radiology imaging for pets. Specifically, it aims to implement and optimize a Large Language Model (LLM) to generate detailed medical reports that describe the health and welfare of pets based on radiology images. By enhancing the accuracy and efficiency of the LLM, the project seeks to improve diagnostic capabilities and provide veterinarians with comprehensive insights into the condition of their animal patients.

Project members

This research project is a collaboration between SubstrateAI and aivancity, School for Technology, Business & Society Paris-Cachan.

Aivancity's research members are:

- Doreid AMMAR, Professor, Researcher, and Academic Dean
- Etienne MAUFFRET, Professor, Researcher, and Head of the MSc Data Engineering

Project timeline

This project started in January 2024. The project consists of four main parts:

1. Preliminary data analysis
2. Overview of the state-of-the-art
3. In-depth data analysis and visualization
4. Training and selecting the best AI (ML & LLM) models

The detailed project timeline is the depicted in Figure 1.

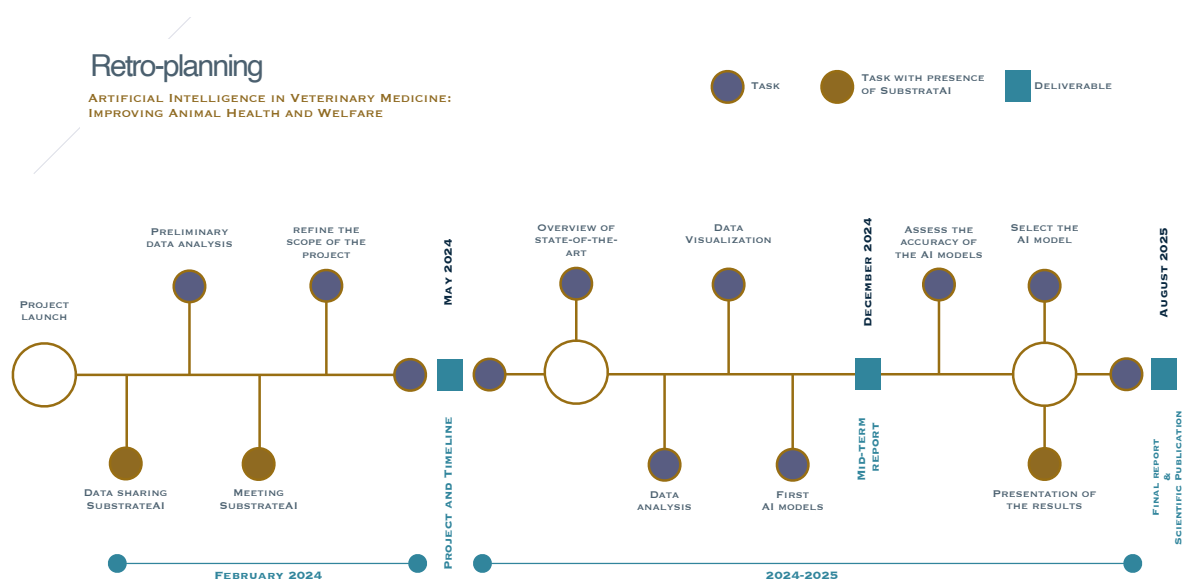


Figure 1: Project timeline

Project progress

A preliminary analysis was conducted on a dataset of 940 radiology images of pets in DICOM format to gain an initial understanding. Figure 2 provides an example of a radiology image of a pet, shown both with annotations (Figure 2b) and without annotations (Figure 2a).

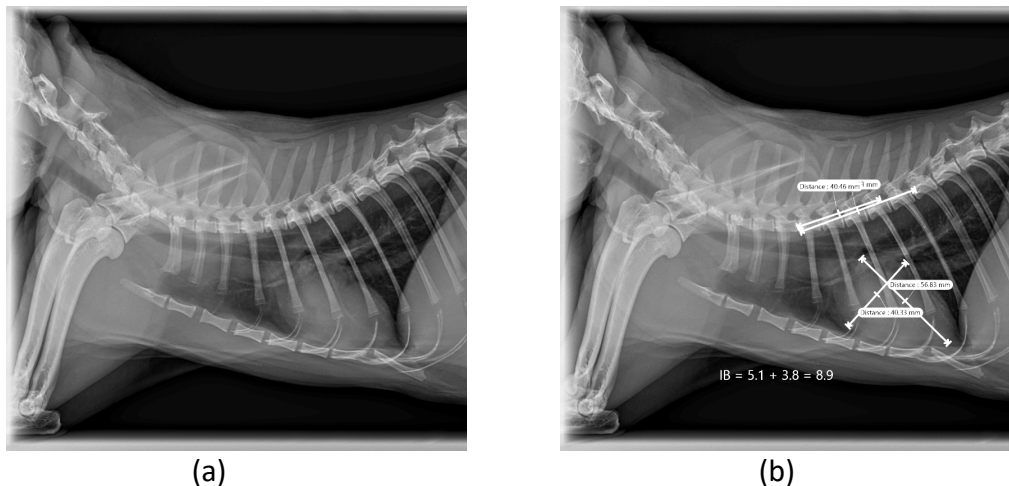


Figure 2: Radiology image of a pet with and without annotations.

Figure 3 outlines the preliminary project pipeline to be executed in subsequent stages. The pipeline begins with a data engineering phase, where data is transformed into a suitable format for analysis using open-source libraries such as Scikit-learn and Keras. This phase is followed by training an initial Convolutional Neural Network (CNN) model to detect the position, delimit the boundaries, and compute the size of an animal's heart. Subsequently, a second CNN model is trained to localize the fourth thoracic vertebra, which is crucial for computing the heart-to-vertebra ratio. The final stage involves implementing and optimizing a Large Language Model (LLM) to generate a detailed medical report describing the health and welfare of the pet based on radiology images.

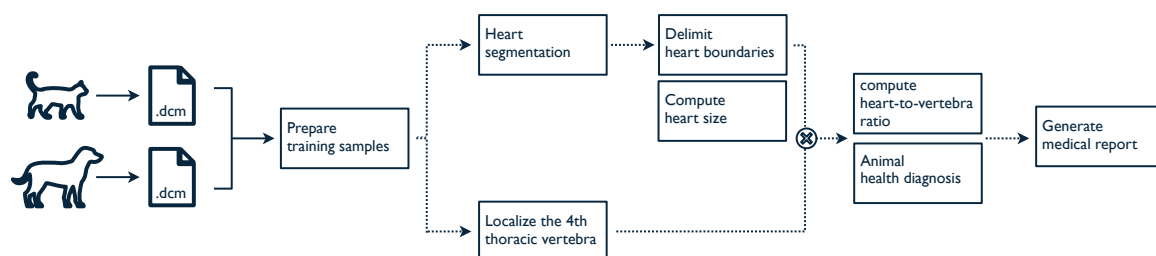


Figure 3: Preliminary project pipeline.

Two aivancity students have recently joined our team and will start the technical work on this project.