

# Anomaly Detection in Sheep Behavior Using YOLO V8 and Faster R-CNN

## (1) Project overview

- **Summary:**

My project focuses on detecting anomalies in sheep behavior, building on my previous work in activity classification (standing, sitting, grazing, and running). The goal is to create a cost-effective system that reduces the need for physical barriers by monitoring sheep's behavior. This time, I aim to detect abnormal behavior by identifying instances where a sheep remains in the same position for too long, signaling potential health risks. Using YOLO V8 for real-time detection and Faster R-CNN for detailed posture analysis, the system will trigger alerts to enable early intervention, improving livestock management and animal welfare.

- **Research Question:**

**How can deep learning models like YOLO V8 and Faster-RCNN be used to detect anomalies in sheep's behavior based on prolonged inactivity?**

- **Objectives:**

- Develop a deep learning model to classify sheep's activity (Sitting, Standing, Running, Grazing) using YOLO And Faster RCNN
- Implement a method to detect anomaly when sheep remains in specific pose for a long time
- Evaluate the accuracy and performance of models in real world use case to detect real time anomalies

- **References:**

- (1) J. Hartung, "A short history of livestock production", *Livestock housing: Modern management to ensure optimal health and welfare of farm animals*, pp. 81-146, 2013.

Link: <https://link.springer.com/article/10.1007/s11250-017-1509-z>

- (2) Grekov, A.N., Kabanov, A.A., Vyshkvarkova, E.V. & Trusevich, V.V., 2023. Anomaly detection in biological early warning systems using unsupervised machine learning. *Sensors*, 23(5), p.2687

Link: <https://www.mdpi.com/1424-8220/23/5/2687>

- (3) Ayub, M.Y., Hussain, A., Ul Hassan, M.F., Khan, B.M., Khan, F.A., Al-Jumeily, D. & Khan, W., 2023. A non-Restraining Sheep Activity Detection and Surveillance using Deep Machine Learning. *16th*

*International Conference on Developments in eSystems Engineering (DeSE), Istanbul, Turkey, December 18-20, 2023, pp. 66-72. IEEE (My own paper)*

Link: <https://ieeexplore.ieee.org/document/10469582/references#reference>

## (2) Project Plan:

- **Tasks**

- **Literature review:** Review and analyze existing work on sheep's behavior & Anomaly
- **Dataset Collection:** I have my own recorded dataset
- **Model training:** Train YOLO V8 to classify sheep's activity
- **Anomaly detection algorithm:** implement anomaly algorithm to flag abnormal behavior when sheep remains in same pose for specific time
- **Evaluation and testing:** Test the system on new data to evaluate anomaly
- **Final writes up presentation:** Prepare the final report and slides for presentation

## Timeline

- **Week 1-2:** Complete literature review and dataset acquisition
- **Week 3-4:** Train YOLO V8 and Faster RCNN on dataset
- **Week 5-6:** Develop and implement anomaly detection algorithm
- **Week 7-8:** Test and validate model and prepare the Readme file on GitHub

## (3) Data management plan:

- **Dataset Overview:** Dataset consists of video footage of sheep, where each frame will be labeled with activities such as standing, Sitting, Grazing, Running. These videos are recorded under my monitoring and covers 2 angles from front to side
- **Data Collection:** Data collected from local farms in Pakistan. With the consent of owner
- **Metadata:** The dataset will include time-stamped video files in .mp4 format. Processed data will be stored in .csv files, and model files will be stored in .pkl format
- **Github version Control:**  
I will create a Github repository for version control and regularly commit code and data processing scripts. Weekly commits will document the progress of model training, testing, and modifications
- **Github link:** <https://github.com/AndroidFury/Anomaly-Detection-in-Sheep-Behavior-Using-YOLO-V8-and-Faster-R-CNN>

- **File name:** File name has been set on project title. And python file name would be same
- **Readme file:**
  - Readme file will include
    - **Description of the project**
    - **Instructions for setting and running the code**
- **Security and storage:**
  - Data and code will be backed up regularly using GitHub for version control and OneDrive for storage
- **Ethical Considerations:**
  - **GDPR:** The dataset does not contain any personal data, thus not falling under GDPR requirements
  - **UH Ethical policy:** The project will follow UH ethical policies for data usage and animal behavior monitoring
  - **Permission to use data:** As I recorded this dataset on my own. I don't need any permission to use
  - **Ethical data Collection:** Any data collected in the field will adhere to ethical guidelines.