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| **Section:** | **4A** |
| **Task:** | **06** |
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*Animal Herd Detection (Alert on Map)*

# Libraries Used

* **cv2 (OpenCV)** → For image processing and object detection.
* **numpy** → For mathematical calculations and handling arrays.
* **geopy.distance** → To calculate the distance between geographic coordinates.
* **matplotlib.pyplot** → To visualize images.
* **folium** → To generate maps, where user and herd locations are displayed.
* **re (Regular Expressions)** → To extract latitude and longitude from Google Maps links.

# Object Detection (YOLO)

* **YOLO model (yolov3.weights and yolov3.cfg)** has been loaded, which is trained to detect objects in images.
* **coco.names** file has been used, which defines object categories (e.g., "sheep", "person", etc.).
* **OpenCV's dnn module** has been used to run the YOLO model for detecting sheep.

# Image Processing

* A **sheep image** has been loaded, and YOLO has been used to detect sheep in the image.
* **Bounding boxes** have been drawn around the detected sheep.
* **Matplotlib** has been used to display the detected image.

# Location Handling

* **User location has been extracted** by taking input either as a Google Maps link or as latitude and longitude manually.
* **Regular expressions (re)** have been used to extract coordinates from a Google Maps link.
* Random herd locations have been generated **(simulated GPS coordinates)**.

# Distance Calculation

* geopy.distance has been used to **calculate the distance between the user's location and detected herd locations**.
* **If the herd is nearby, an alert message is printed.**

# Map Visualization

* **Folium** has been used to generate an interactive map.
* **User location is marked with a blue marker.**
* **Herd locations are marked with red circles.**
* The map is displayed inside the Jupyter Notebook.





