

AER1217 Development of UAVs

This lab focuses on UAV development and georeferencing using UAV payload data. The provided python scripts process images, extract target locations, and transform coordinates into a global reference frame.

Folder Structure

- **lab3/**: Contains all the scripts, dataset to perform the georeferencing task
 - `undistort_image.py`: Corrects lens distortion in images using camera intrinsic parameters.
 - `extract_target_px_location.py`: Detects circular targets in images and returns their pixel coordinates.
 - `transformations.py`: Contains functions to transform coordinates into different frames.
 - `main.py`: Import the upon 3 python scripts to process images to detect targets, transform their coordinates, and cluster detections using **DBSCAN**, and lastly make the plot for the estimated target location.

How to Run

1. Lab 3 Scripts:

- Ensure the required dependencies are installed: `numpy`, `opencv-python`, `matplotlib`, `scikit-learn`, `scipy`, and `pandas`.
- Place the input images in the `lab3/output_folder` directory.
- Ensure the pose data is in `lab3/lab3_pose.csv`.
- If there's error finding the required files, go to `main.py` and change the `image_folder_path` and `csv_path` as to your preference.
- Run `main.py` to process the images and generate the target positions plot.

```
python lab3/main.py
```

Dependencies

- Python 3.12
- Required libraries:
 - `numpy`
 - `opencv-python`
 - `matplotlib`
 - `scikit-learn`
 - `pandas`
 - `scipy`

Outputs

- **Lab 3:**
 - Undistorted images displayed during processing.

- A plot of clustered target positions saved as `lab3/Target Positions.png`.

Notes

- Ensure the input images and pose data are correctly formatted and placed in the appropriate directories.