README for bird color ring reading

The data in this folder is all found in the dataset folder. There are multiple datasets that you could choose to use to train your model. We would however suggest using all the datasets!

Datasets:

lyngoy (3600 images, 874 labels)

Camera trap images from Lyngøy south of Bergen. Varying quality and many photos out of focus. The YOLO model did not detect rings on all these images.

rf (20 218 images and labels)

Include photos from the automated PTZ camera at Realfagstaket in 2024. Decent quality photos.

ringmerkingno (11 536 images and labels)

This includes photos downloaded from https://ringmerking.no/cr, the national Norwegian color ringing database. The images were originally high-quality, but they were downscaled to meet the database requirements and online storage space. This dataset also includes other species, so the rings are not always black. This is documented in the color field in the CSV files. This is also the only dataset that has other species with other code combinations. This means this dataset also includes codes that don't start with J. Most rings have the first character at the bottom, but there are some mistakes at ringing, and the rings are sometimes upside down, so the model needs to take this into account.

Structure:

Each dataset is structured into images, labels, and ringcodes.csv

- The images folder contains all the images. Each image contains only one code/ring (hopefully)
- The labels folder contains YOLO structured txt files with bounding boxes for ring detections in the images (from the ringdetection20240404.pt YOLO model)
- The ringcodes.csv is a CSV file that links the filename, ring code, and ring color. The CSV file is separated with |.
    - The ring colors follow something called the EURING standard:
        - NW = black with white text
        - WN = white with black text
        - GW = green with white text
        - BW = blue with white text
        - SN = silver with white text
        - PN = pale blue with black text
        - YN = yellow with black text
        - ON = orange with black text
        - BO = blue with orange text
        - RW = red with white text
        - RY = red with yellow text

        - SW = silver with white text
        - WG = white with green text
        - WR = white with red text
    - These colors will cover more than the model will likely ever encounter in real life in Norway. NW, WN, GW, BW, SN, and PN are the colors used in Norway, and therefore most important.
    - You could choose to simplify your model by only keeping the NW colored codes (these have the most training data), but all non-black rings in the evaluation dataset will be judged as a misread (about 20 %).
    - All characters in the codes are uppercase.

Validation of the model:

The models delivered will be judged against a similar dataset with images closely resembling the ones in the three datasets. The validation dataset contains around 10,000 photos, and some images will include more than one ring/code in the picture. The codes on the validation dataset are mostly new combinations, not present in the training datasets.

Testing of the models for evaluation will be conducted on an Ubuntu VDI with 8 cores, 64 GB RAM, an NVIDIA T4 GPU, and Python 3.12.4.

We will use a weighted F1 score to evaluate which model is the best, where we penalize false positives more than false negatives, as a wrong code is worse in our use case than a missed code.

$$F1_{weighted} = \frac{1.25 \cdot Precision \cdot Recall}{0.25 \cdot Precision + Recall}$$