DJI Intelligent Computing Platform
Algorithms on Aircraft Step by Step Guide

Training

For training the model, a Linux operating system with an Nvidia GPU is required.

Anaconda Install (Linux)

Anaconda 3 or Miniconda are required to run the model training. If already installed, this section can be skipped.

1. Open the terminal
2. Run wget https://repo.anaconda.com/miniconda/Miniconda3-latest-Linux-x86_64.sh
3. Run bash ~/Miniconda3-latest-Linux-x86_64.sh
   a. If asked whether you want to automatically start the program when the terminal is opened, enter Yes so that the conda command will automatically be available in the next steps

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MMYOLO Install

1. Open the terminal and navigate to where you want to install mmyolo
   a. To make a folder, such as a projects folder, run mkdir Projects and cd Projects
2. Run git clone https://github.com/open-mmlab/mmyolo.git
3. Run cd mmyolo
4. Run git checkout tags/v0.6.0 and git switch -c drone-model-training
5. Run git apply ~/Downloads/ai_inside_model/0001-NEW-ai-inside-init.patch

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MMYOLO Setup

1. Open the terminal and run conda create -n mmyolo python=3.8 pytorch==1.10.1 torchvision==0.11.2 cudatoolkit=11.3 -c pytorch -y
2. Run conda activate mmyolo
3. Run pip install openmim
4. Run mim install "mmengine>=0.6.0"
5. Run mim install "mmcv>=2.0.0rc4,<2.1.0"
6. Run mim install "mmdet>=3.0.0,<4.0.0"
7. Run pip install -r requirements/albu.txt
8. Run mim install -v -e .
9. Run pip install albumentations==1.3.1

Config

1. Copy the dataset to a folder inside the repo such as /mmyolo/data/your-dataset
2. Open the yolov8_s_syncbn_fast_8xb16-500e_coco.py config file
3. Edit the data_root, train_ann_file, train_data_prefix, val_ann_file, and val_data_prefix paths to those of your dataset.
4. Set num_classes to the number of classes in your dataset (must be <10)
5. Set train_batch_size_per_gpu to the max your gpu can handle
6. Add class_name = ['your class 1', 'your class 2', etc…] and metainfo = dict(classes=class_name, palette=[(20, 220, 60), (0, 0, 255), (255, 0, 0)])
   a. If using the pothole dataset, class_name = ['pothole', 'crack', 'manhole']
   b. The number of palettes must be equal to the number of classes
7. Scroll down to train_dataloader and val_dataloader and add metainfo=metainfo to both dataset dictionaries below the data_root value.

Training

1. Open the terminal
2. Run CUDA_VISIBLE_DEVICES=0 ./tools/dist_train.sh configs/yolov8/yolov8_s_syncbn_fastt_8xb16-500e_coco.py 1

Upload to Drone

Upload and Quantization

1. Navigate to https://developer.dji.com/ai-inside/model
2. Select "Upload Model"
3. Add the model's pth file created from the training
4. Add about 500-1000 images in a zip file. In the potholes dataset, dataset/dataset/valid/images can be compressed into a .zip and uploaded.
5. Matrice 4 Series should already be selected by default
6. Add the classes, such as pothole, crack, and open_manhole to the list under "Recognition Type"

Validation

1. Select Validate once the model has been quantized
2. Enter a name, and select a second .zip of images to upload. For the pothole dataset, dataset/dataset/test/images can be compressed and uploaded
3. To view less confident predictions, you can lower the confidence level

Distribution

1. Navigate to https://developer.dji.com/ai-inside/distribution

2. Select "New"
3. Enter a task name, and select the previously quantized model from the dropdown list
4. Download the template, remove the example drone serial numbers and add your own, and then import the file under "Aircraft SN List"
5. Set an expiration time for the model to no longer be available for the drone list
6. The confidence level can be adjusted to show more or less detections based on the prediction confidence level
7. Click confirm, and once the status changes to "Distributed", press the download button
8. Copy the model.zip to the drone's sd card.

Import and Usage

1. Open the Pilot 2 app
2. Click the settings/profile icon in the top left corner
3. Click "Algorithm Management"
4. Click "From SD Card"
5. Select the sd card from the list of folders
6. Navigate to the place where you saved the model.zip, and select it
7. Press "Confirm" in the top right corner
8. Navigate back to the main page of the app, and enter the camera view
9. Click "AI" on the left side menu to enable AI Recognition, and then click the dropdown icon that appears below the ISO/F/Shutter widget.
10. Inside the dropdown, clicking the left/right arrow in the top row opens the list to select between the DJI and imported models