Forest Fire Detection Review Report-3

Shun Li[1]

Concordia University

September 18, 2021

Table of Contents

In this paper, the authors develop a new DNN-based solar panel failure detection system.

Highlights:

- The database is obtained by UAVs equipped with a thermal infrared camera.
- Use the Mask RCNN as the main algorithm for the object detection and instance segmentation.
- The performance of proposed network and other mature network are compared.

Notes:

The thermal images has many advantages than RGB images. However, a normalization and a transformation into a black and white image are required, for obtaining a single information channel.

Main task

The Mask RCNN can accomplish 3 tasks at the same time:

- Location: It can give the boundary box of the object.
- Classification: The object classes are labeled.
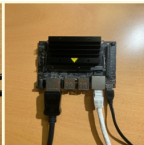- Segmentation: it segment the object at the instance level.
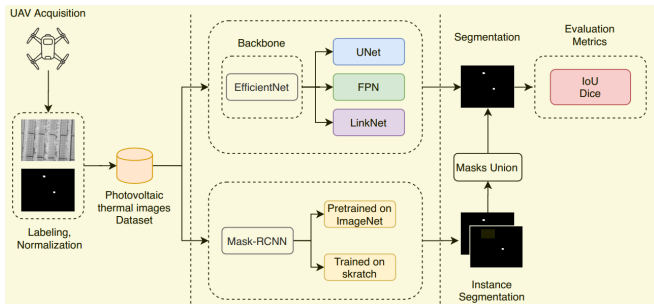
The main task:

A UAV detection system based on the rotating wing drones and nvidia onboard computer is developed and implemented in this paper.
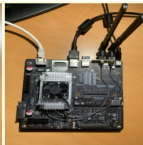
- several object detection algorithms like SSD, YOLO, and RCNN are introduced in the beginning of this paper.
- the hardware platform are compared.

(a) Raspberry Pi 4   (b) Nvidia Jetson Nano   (c) Nvidia Jetson TX2   (d) Nvidia Jetson AGX Xavier board   (e) UAV Embedded with AGX Xavier board
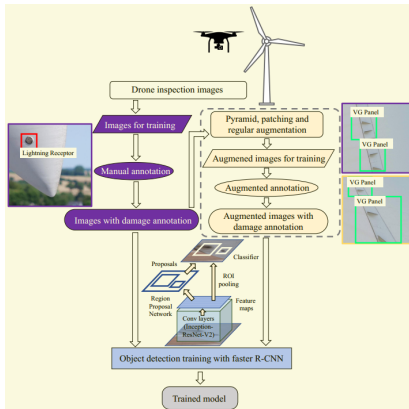
- YOLO-v3, YOLO-v3–tiny, YOLO-v4, and YOLO-v4–tiny are developed and tested on the dataset.
- The YOLO-v4–tiny has the best performance.

Main Idea:
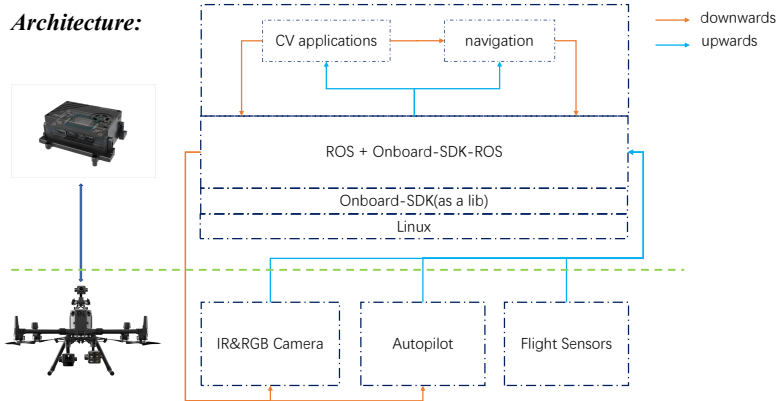
The faster RCNN algorithm are implemented to detected the injuries of the wind turbine blades. Then the authors compare several preprocessing methods on several faster RCNN based models.

Architecture:

Tasks:

- Computer Vision module for the fire and smoke detection.
- Navigation module for guidance.

Conclusions:

- Some of the detection algorithms are ready to implemented on the drones.
- YOLO trends to have the lower accuracy to detect the small and overlap of the object comparing with RCNN, while the RCNN runs much slower than YOLO.
- The software environment and the communication of the M300 and YunGuan2 are tested in the past 1 week.

Ideas:

- The next step to implement the aforementioned methods, and use the metrics to reproduce the basic algorithm as well as their derivates:

  - Implement the YOLO and some simple navigation algorithm on the M300.
  - Change the detection with Linhan's algorithm.
  - Prepare for the flight test.

Thank you!