

Vineyards Detection in Aerial Images

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Summary

1. Reuse the capabilities of a provided machine learning (ML) model trained on vine lines detection.
2. Extend the detection to other objects of interest
3. Provide metrics and visualisations for the new objects

Introduction

- **Precision agriculture** enhances the agricultural yields by addressing variabilities within the crops with the use of sensors and automated methods.
- **Vine lines** detection allows the automation of the pesticide spraying of vineyards or the yield estimation.
- The detection of **obstacles** is required to plan the optimal flight path from aerial maps.
- Other objects commonly found in vineyard could be detected to enhance the **understanding of the environment**.

Methods

The roofs are chosen to extend the capabilities to other objects since they often neighbor vineyards and may be avoided by drones

To detect them, three methodological approaches were tested:

- The training of a new ML model from scratch.
- The transfer learning on a ML model pre-trained on vine lines
- The use of two ML models for vine lines and other objects

Results

The two-models approach is performed in two steps:

1. The first model whitens the pixels detected as vine
2. The second model merges the preceding result with its own detection (here roofs are represented as red).



Conclusions

- The two-models options performed best, leaving the vine lines detection intact while successfully enabling extensions to other objects.
- The roof detection is obtaining a bounding box IoU of 64.94 ± 12.3 , which could be improved through more training.