

Vision-based automated systems are a promising way to speed up the identification process of pest psyllids like *D. citri* and *T. erytreae*

Potential for automation of citrus pest identification using computer vision-based artificial intelligence recognition

Background: Psyllid pests are significant vectors of a greening disease that affects citrus. *Trioza erytreae*, a native psyllid, transmits citrus greening disease associated with '*Candidatus Liberibacter africanus*'

However, South Africa faces the threat of an incursion by *Diaphorina citri*, a highly efficient vector of Huanglongbing (HLB) that is associated with '*Candidatus Liberibacter asiaticus*'

Detection of psyllid pests is crucial for effective management, with yellow sticky traps being commonly used

Identification of psyllids on traps is done manually, but is time consuming and delays control needed to prevent disease spread

Result: Mean average precision (mAP), precision, recall and time per sticky trap for five trained models. YOLOv8s was most precise, but YOLOv8m was the most sensitive without sacrificing accuracy.

| Model | mAP | Precision | Recall | Time per trap (seconds) |
|---------|-------|-----------|--------|-------------------------|
| YOLOv8s | 0.849 | 0.905 | 0.777 | 6.7 |
| YOLOv8m | 0.845 | 0.897 | 0.797 | 12.7 |
| YOLOv8n | 0.831 | 0.742 | 0.859 | 3.7 |
| YOLOv8l | 0.797 | 0.797 | 0.786 | 21.4 |
| YOLOv8x | 0.781 | 0.777 | 0.689 | 29.2 |



Methods



Trap collection



Trap photography

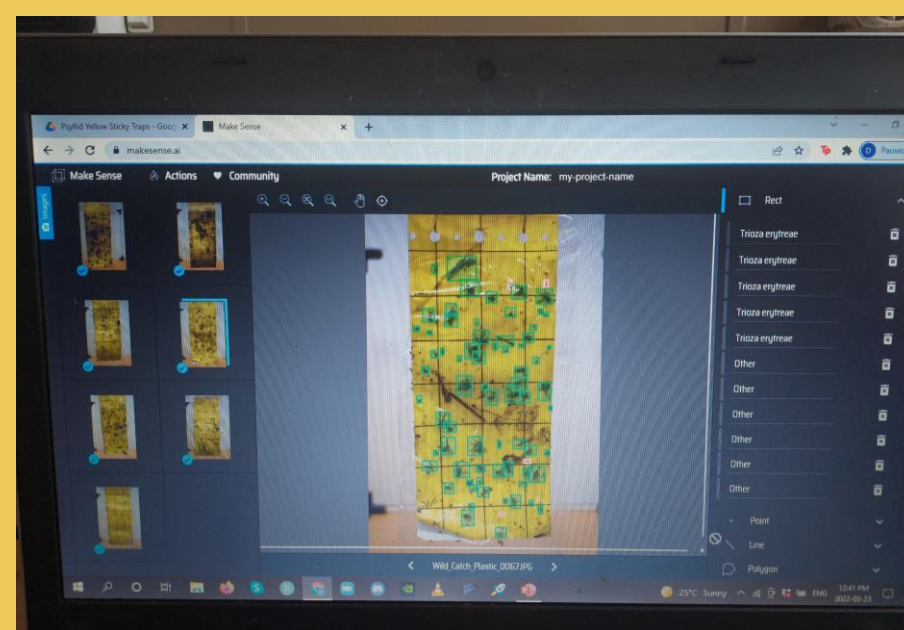
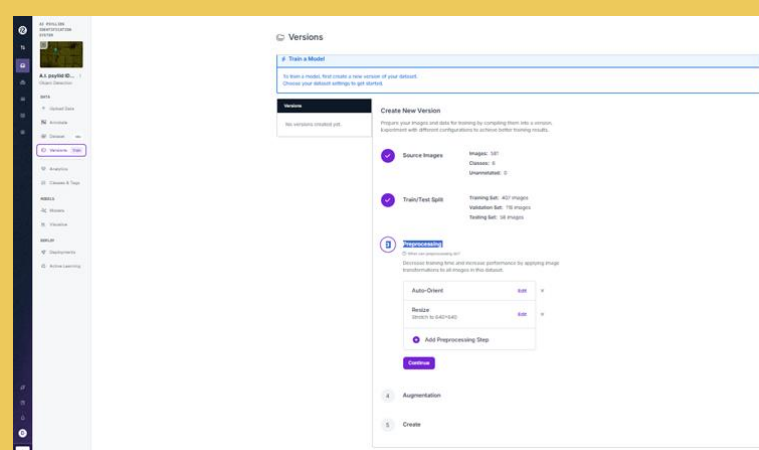
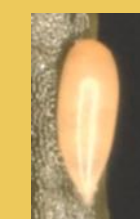
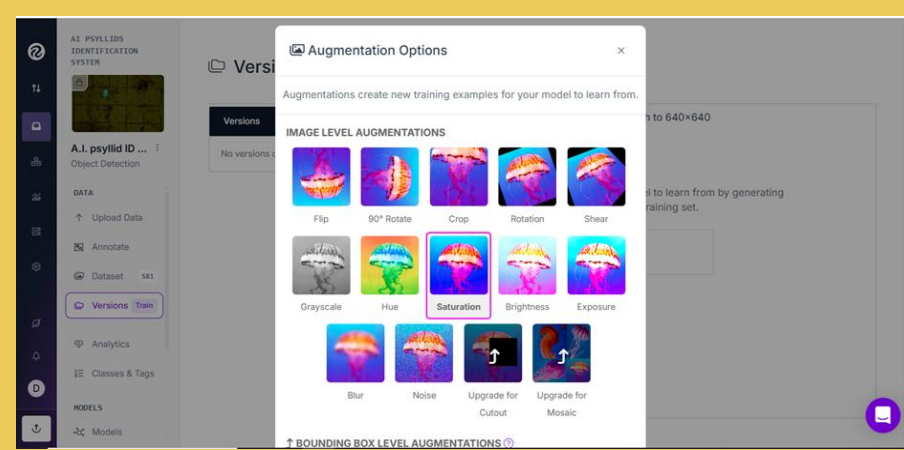


Image annotation



Training, validation and testing



Data augmentation

The A.I. developmental process from trap collection to model testing, using 875 cropped images that were augmented, processed, and then split into training, validation, and testing datasets in a ratio of 7:2:1

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