Locating wheat heads unsupervised

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1 Introduction

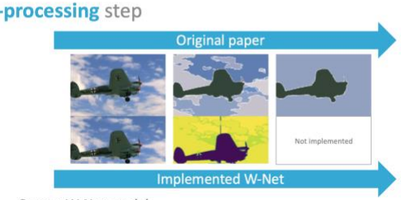
- **Locate wheat heads** to improve farm quality
- Gaining training data is **labour intensive**
- Instead use an **unsupervised-learning** method
- Measure the impact of **pre-processing images**

Main question:

"How can frequency information be used to improve the performance of the unsupervised segmentation model WNET, when applied to identify wheat heads in images."

3 W-Net model

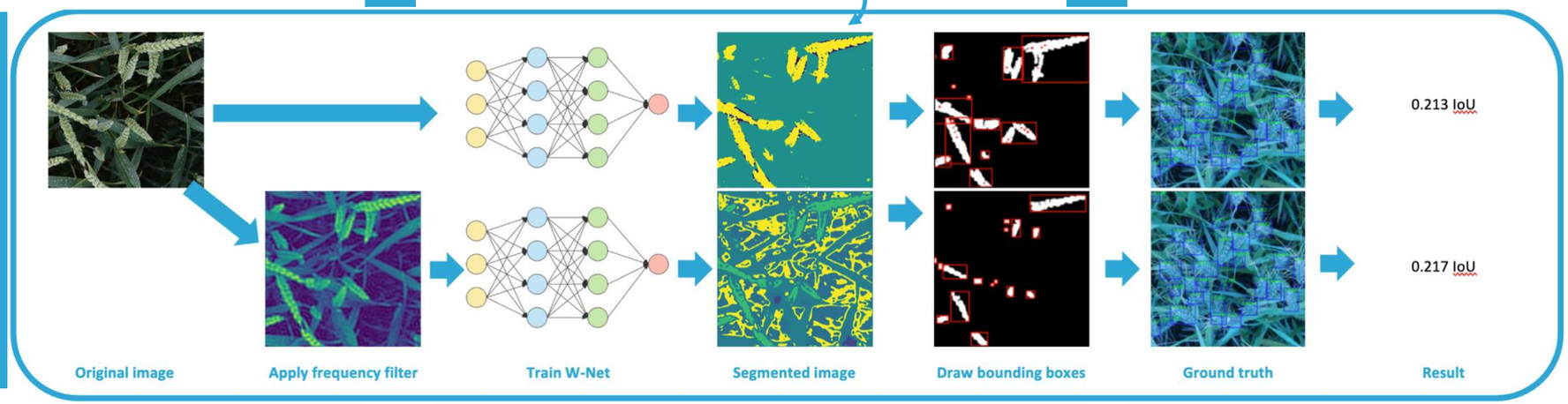
- **Unsupervised semantic segmentation**
- Authors did not published source code
- Implementation **misses post-processing** step



Output W-Net model

5 Discussion

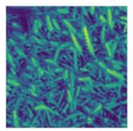
- **W-Net generates semantic segmentation**
- **Ground truth are bounding boxes**
- **80% worse precision** compared to (supervised) **baseline method**



2 Method: Train using three datasets

- Dataset with **plain** wheat images
- Dataset with **high pass filter**
- Dataset with **custom mask**

Original image

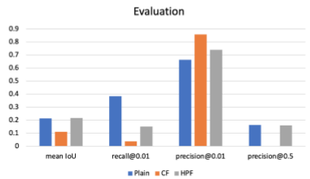


High pass filter

Custom mask

4 Results

- HPF shows IoU **1,4% improvement**
- **Precision@0.5 no improvement**
- **80% worse precision** compared to (supervised) **baseline method**
- Deviation reconstruction loss is smaller with FFT



model	precision@0.5
baseline	0.77
W-Net with HPF	0.16

6 Conclusion

- **No competing** wheat head detection **accuracy**
- **Some basic wheat head detection**
- **High pass filter improves accuracy**
- **Freqency information decreases deviation reconstruction loss**

Paper: Combining frequency information and W-Net on precision agriculture

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