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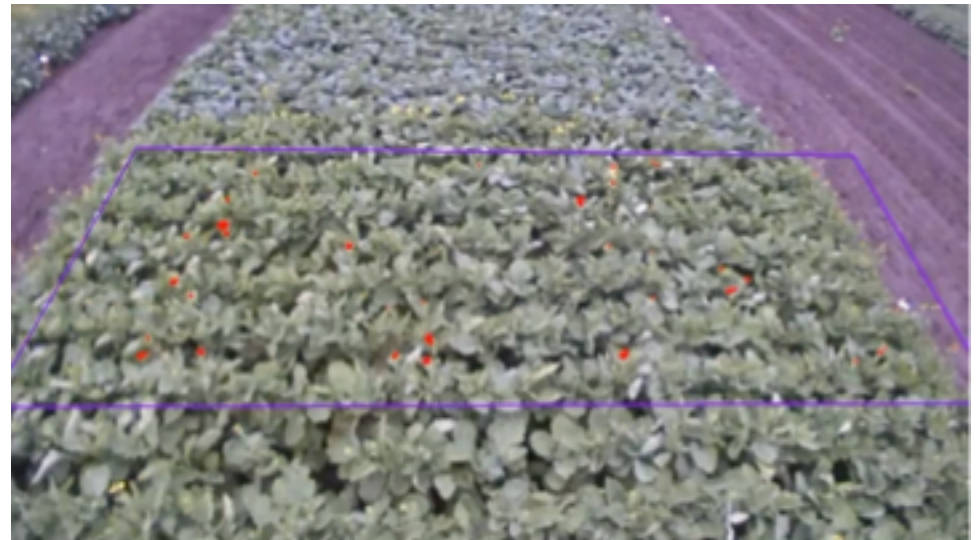
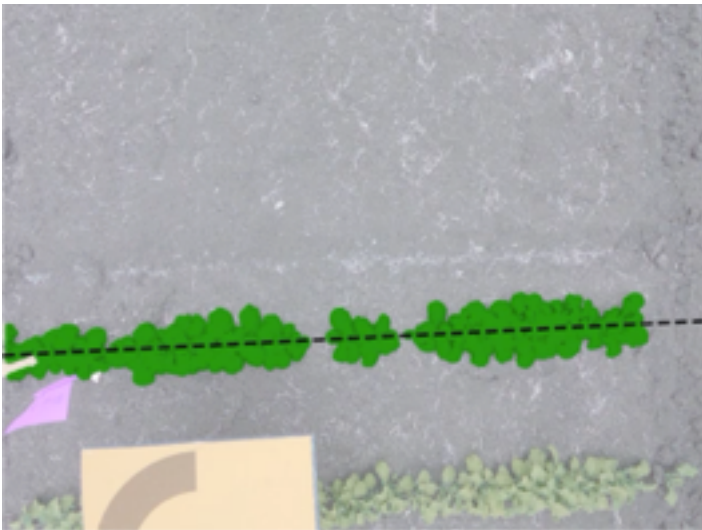
USask

↳ UBC

↳ Stanford

↳ USask (Comp Sci, since 2012)

Co-lead P2IRC Flagship 3:
Deep Learning for Phenomics



collaborators



Mark Eramian



Kevin Stanley



Carl Gutwin



Steve
Shirtliffe



Kirstin Bett



Curtis
Pozniak



Sally Vail



Christina
Eynck



Isobel
Parkin



Bobbi
Helgason



Steve
Siciliano

what methods do we *develop*

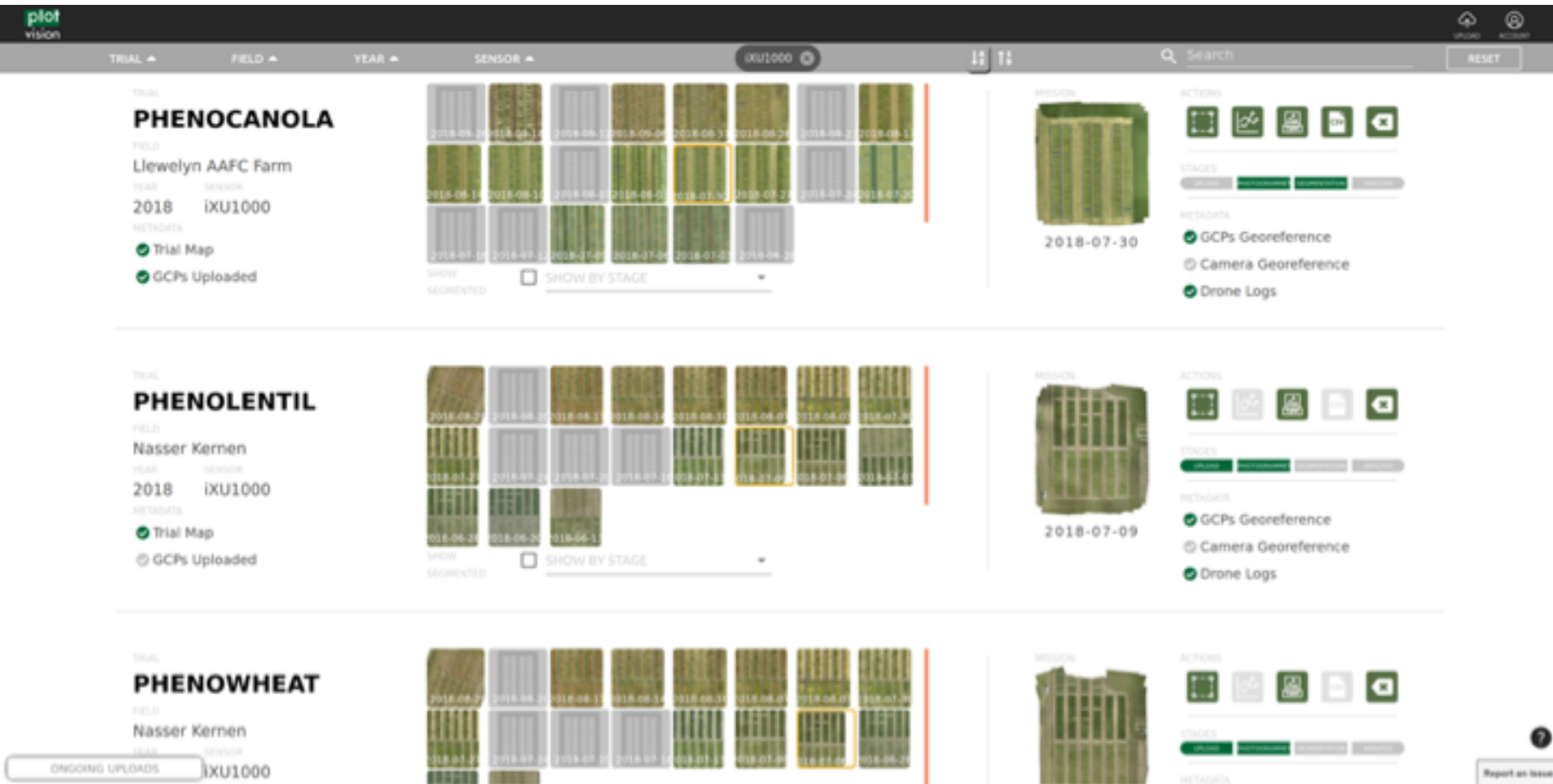
- Modeling (mechanistic, Bayesian)
- Machine learning (hand-selected features)
- Deep learning (learned features)

what tools do we *use*

- GPU Servers (Copernicus), Cameras, Python

Aerial Image Analysis

<https://plotvision.usask.ca>



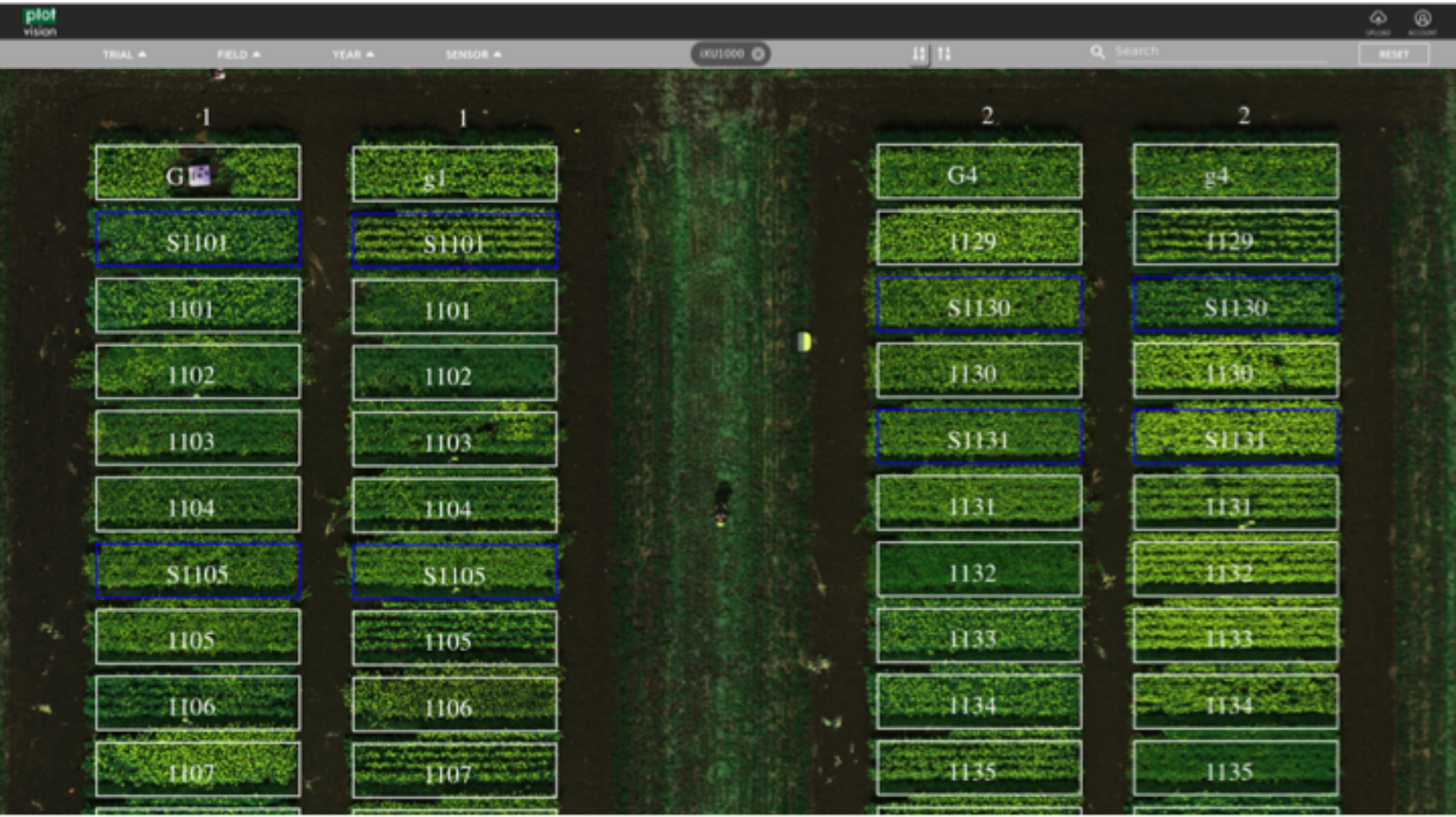
The screenshot displays the Plot Vision web application interface, which is used for aerial image analysis. The interface is organized into three main sections, each representing a different trial:

- PHENOCANOLA:**
 - TRIAL:** PHENOCANOLA
 - FIELD:** Llewellyn AAFC Farm
 - YEAR:** 2018
 - SENSOR:** IXU1000
 - METADATA:**
 - ☒ Trial Map
 - ☒ GCPs Uploaded
 - SHOW SEGMENTED:** ☐ **SHOW BY STAGE:** ☐
 - MISSION:** 2018-07-30
 - ACTIONS:**
 - ☒ GCPs Georeference
 - ☐ Camera Georeference
 - ☒ Drone Logs
- PHENOLENTIL:**
 - TRIAL:** PHENOLENTIL
 - FIELD:** Nasser Kernen
 - YEAR:** 2018
 - SENSOR:** IXU1000
 - METADATA:**
 - ☒ Trial Map
 - ☐ GCPs Uploaded
 - SHOW SEGMENTED:** ☐ **SHOW BY STAGE:** ☐
 - MISSION:** 2018-07-09
 - ACTIONS:**
 - ☒ GCPs Georeference
 - ☐ Camera Georeference
 - ☒ Drone Logs
- PHENOWHEAT:**
 - TRIAL:** PHENOWHEAT
 - FIELD:** Nasser Kernen
 - YEAR:** 2018
 - SENSOR:** IXU1000
 - METADATA:**
 - ☒ Trial Map
 - ☐ GCPs Uploaded
 - SHOW SEGMENTED:** ☐ **SHOW BY STAGE:** ☐
 - MISSION:** 2018-07-09
 - ACTIONS:**
 - ☒ GCPs Georeference
 - ☐ Camera Georeference
 - ☒ Drone Logs

The interface also includes a top navigation bar with options for **TRIAL**, **FIELD**, **YEAR**, and **SENSOR**, as well as a **RESET** button. A search bar is located in the top right corner. The bottom left corner features a button for **ONGOING UPLOADS**.

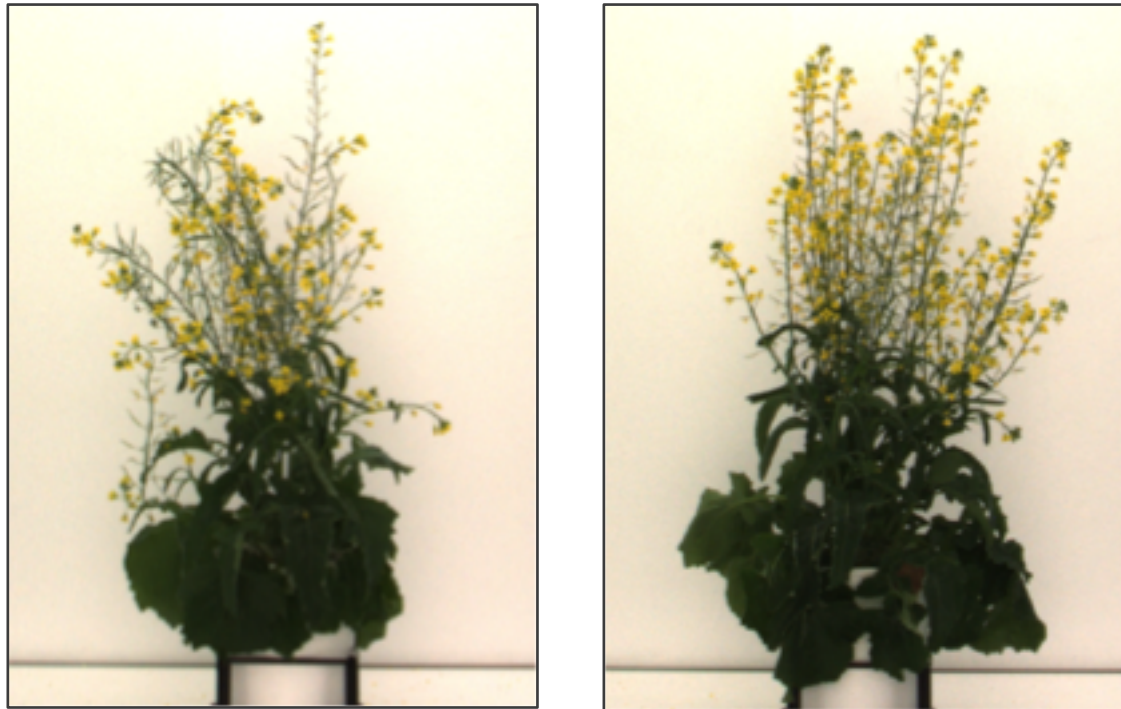
Aerial Image Analysis

<https://plotvision.usask.ca>



Stress Response Phenotyping

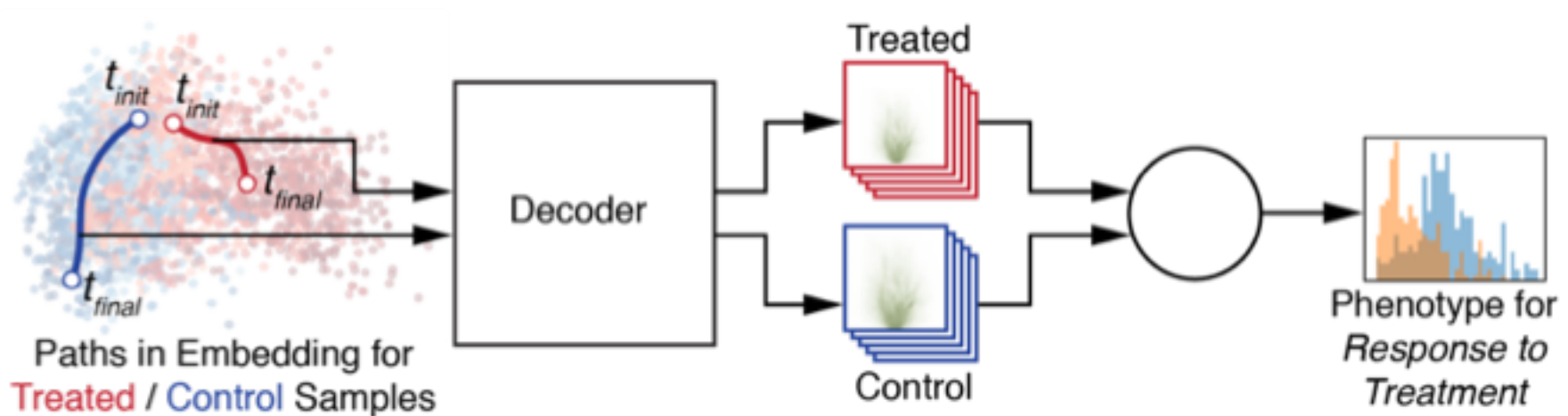
<https://github.com/p2irc/lsplab>



Ubbens, J., Cieslak, M., Prusinkiewicz, P., Parkin, I., Ebersbach, J., & Stavness, I. (2020). Latent space phenotyping: Automatic image-based phenotyping for treatment studies. *Plant Phenomics*, 2020, 5801869.

Stress Response Phenotyping

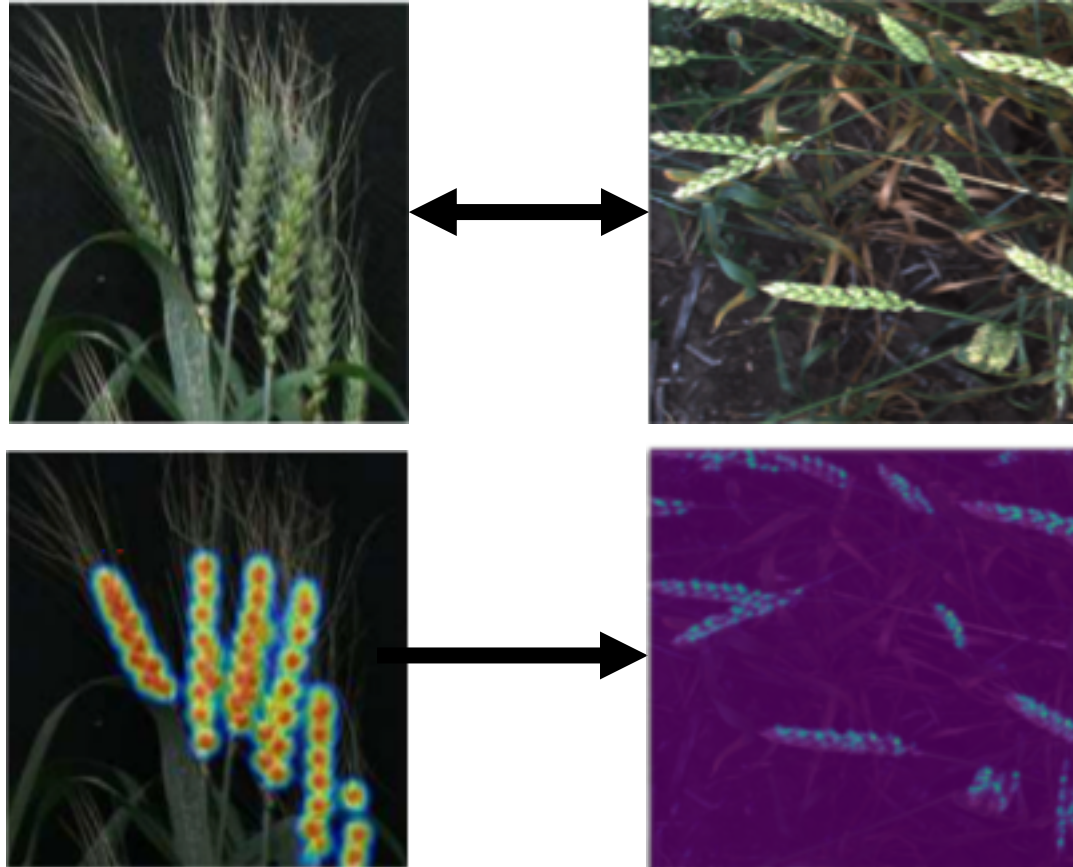
<https://github.com/p2irc/lspLab>



Ubbens, J., Cieslak, M., Prusinkiewicz, P., Parkin, I., Ebersbach, J., & Stavness, I. (2020). Latent space phenotyping: Automatic image-based phenotyping for treatment studies. *Plant Phenomics*, 2020, 5801869.

Domain Adaptation

<https://github.com/p2irc/uda4poc>



Ubbens, J., Ayalew, T., & Stavness, I. (2020). Unsupervised Domain Adaptation For Plant Organ Counting. ECCV Workshops, 2020.

Global Wheat Competition

<https://www.kaggle.com/c/global-wheat-detection/>



what would I like in a food-water nexus

- Computer science as a *research* pillar and a *technology* platform
- Research problems:
 - Learning across scale and modality
 - Using field measurements to calibrate aerial analyses
 - Generating *actionable* information and *useful* tools
- Training programs, e.g. CMPT/PLSC 898

big question for the group

What *new data analysis* would
transform your experiment?

Can we be the *world leader*
in food-water *data*?