WSU WHEAT PREDICTIONS

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GOAL

- The objective is to calculate vegetation indices using captured images
  - Detect grey reference panel and perform radiometric corrections for the images
  - Plot segmentation
  - Calculate vegetation indices

STEPS

- Segment gray reference panel from the image

- Use it calculate reflectance (pixel value/average value of gray panel) to eliminate variation in sun light intensity

- Perform radiometric calibration (correct value of the images for each camera) to eliminate variations

- Calculate GNDVI and SCI at each pixel

- Segment wheat fields

- Calculate summary statistics of GNDVI and SCI in each plot fields

- These values can be used to track the growth and vigor of wheat crop in the field

CHALLENGE

- Too much variability that traditional image processing steps did not work for all images and cameras.

SOLUTION

- You only look once (YOLOv8) – AI model

- Labels were created in makesense.ai website and exported as YOLO format

- Images were divided into training (70%), testing (20%), and validation (10%)

- Based on the input image and label, model got trained.

- From the center of gray panel, a square area of 11 x 11 was selected and average value was calculated
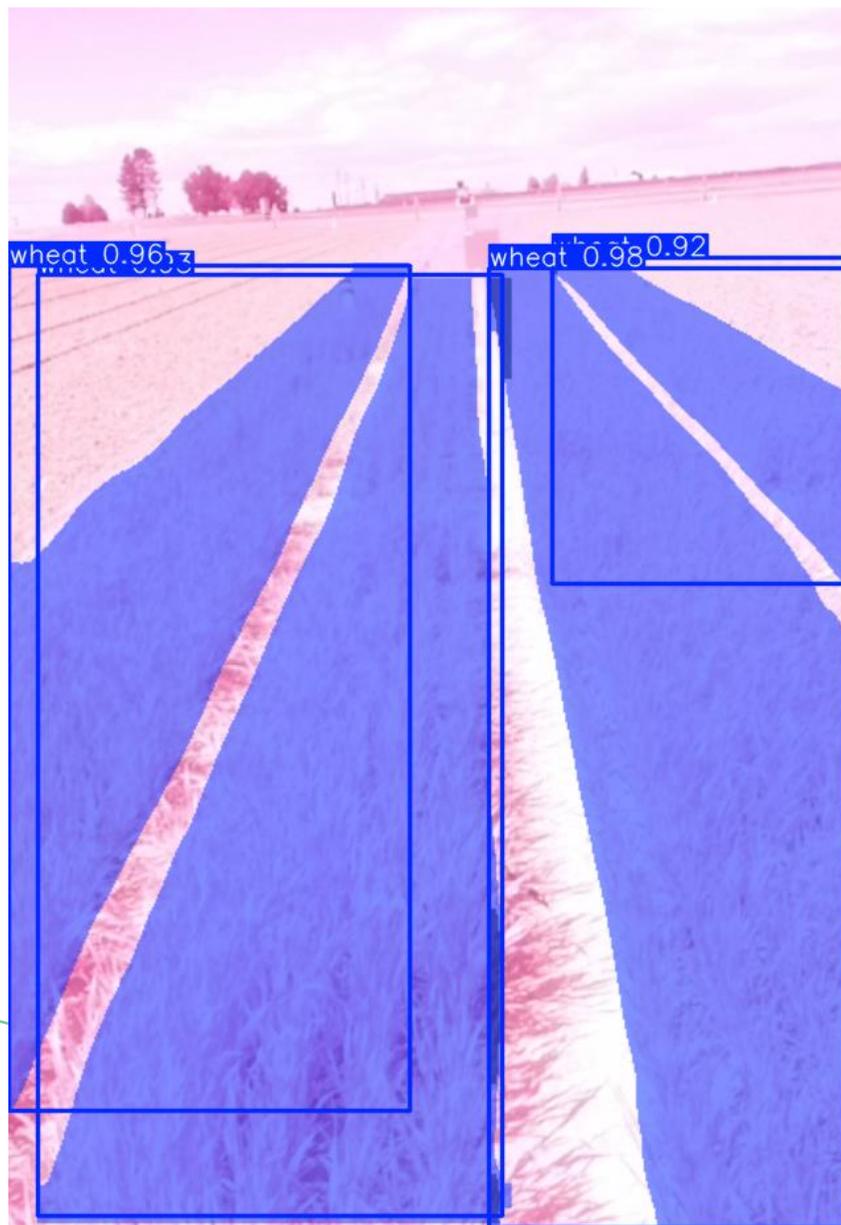
Green Normalized Difference Vegetation Index (GNDVI)
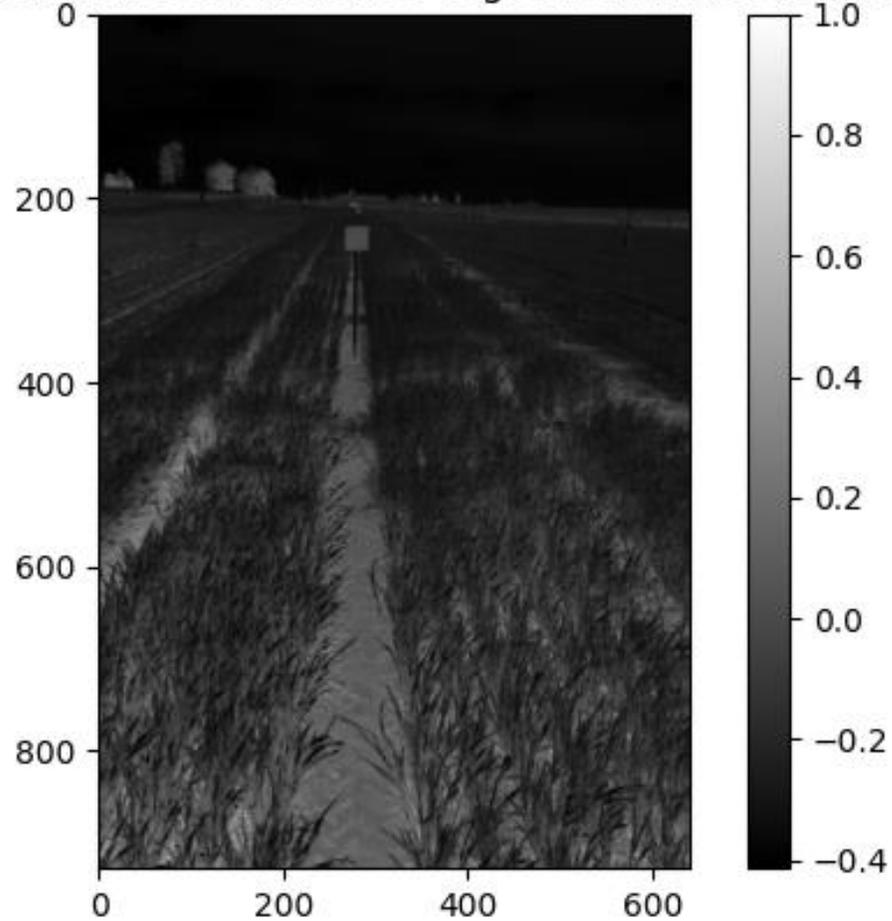
SEGMENTATION OF WHEAT FIELD

- GNDVI images were labeled using CVAT software

- Exported through the Segment mask 1.1 format

- Trained through YOLOv8 segmentation model

SEGMENTATION RESULTS

Metrics	Precision	Recall	mAP@0.50	mAP@0.50-0.95
Field	99.9%	100%	99.5%	90.1%
Panel	99.9%	100%	99.5%	93.8%

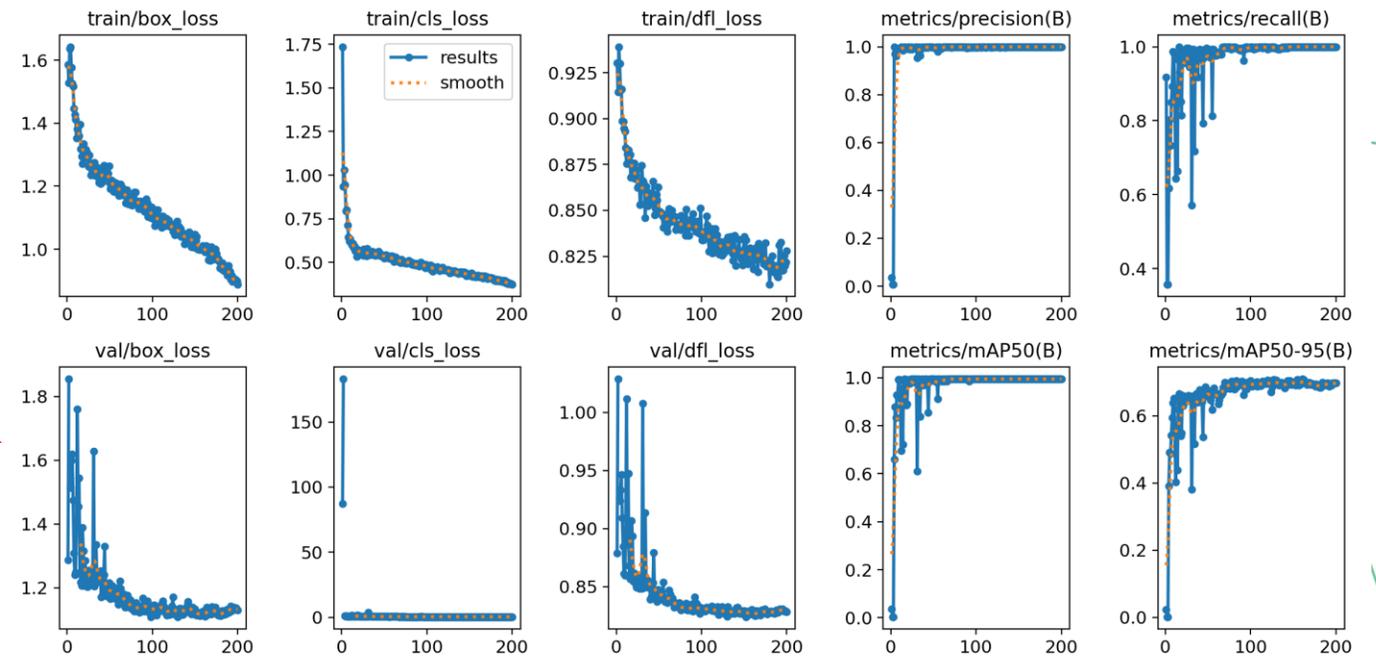# *RESULTS CONT.*

CONCLUSIONS

- AI model is robust in segmenting gray plate and wheat fields

- Further work is necessary to subdivide the wheat field into smaller plots

- In several plots, it is hard to distinguish as there was a slush growth of wheat

- Heuristics could be used to subdivide the plots
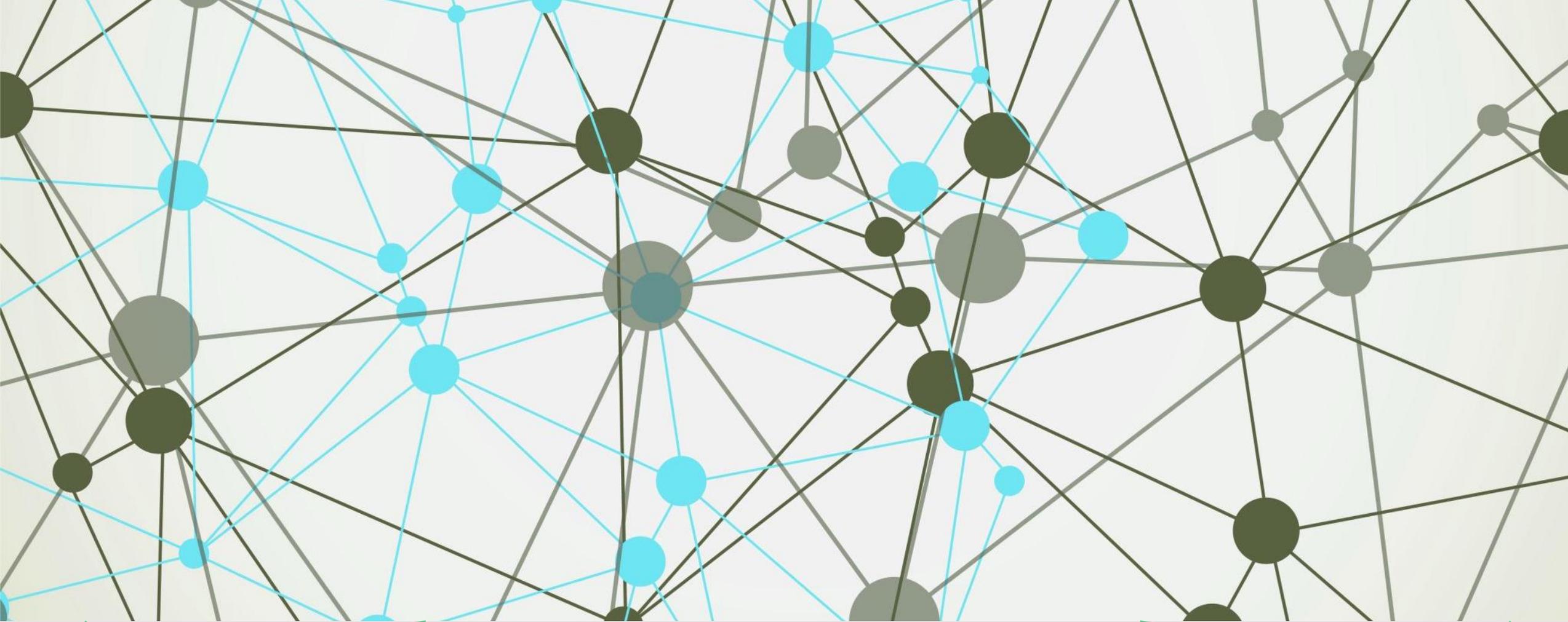
THANKS!

RESULTS

Grey Reference Panel
Detection Model

Wheat
Segmentation
Model