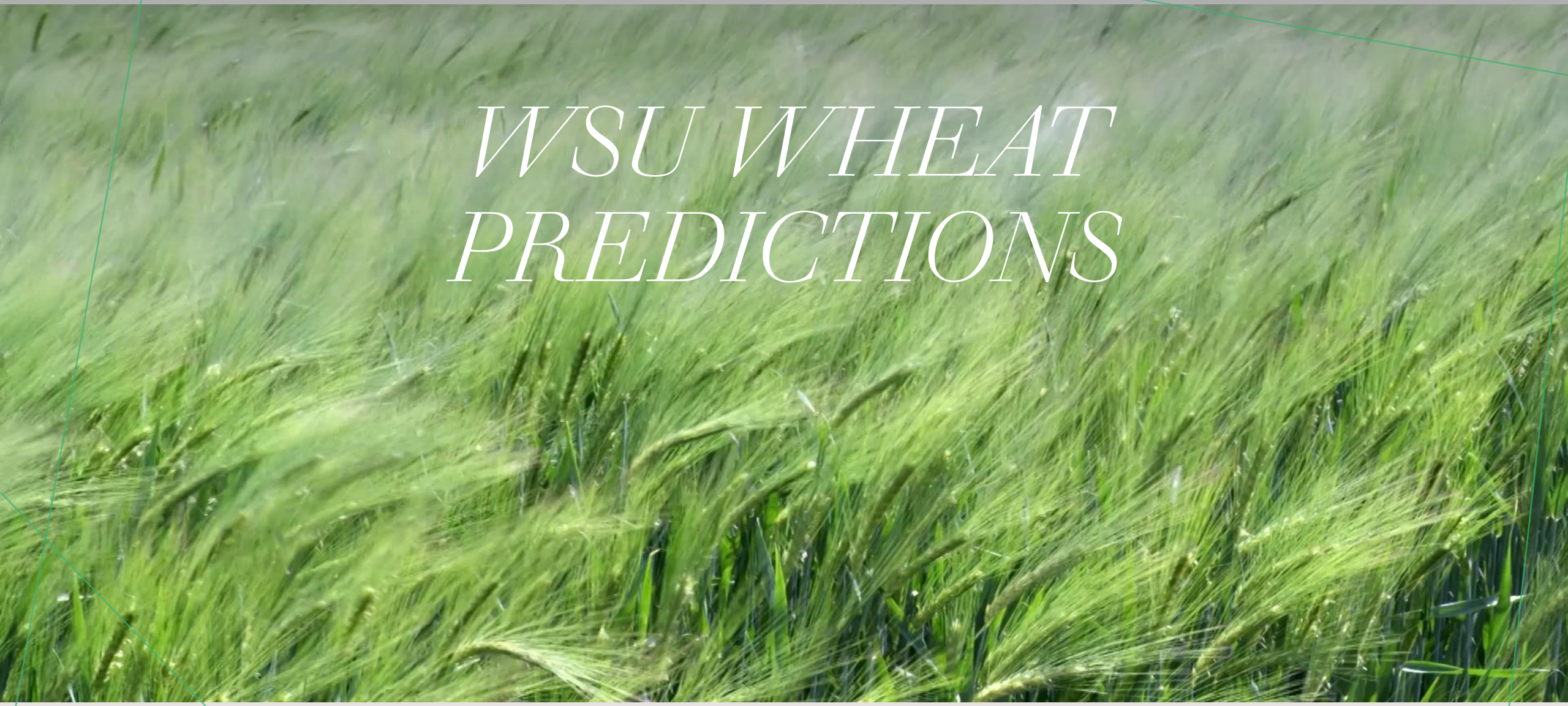


WSU WHEAT PREDICTIONS

Vishal Jeyam

Advisors: Dr. Sankaran, Ms. Tharanganee

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

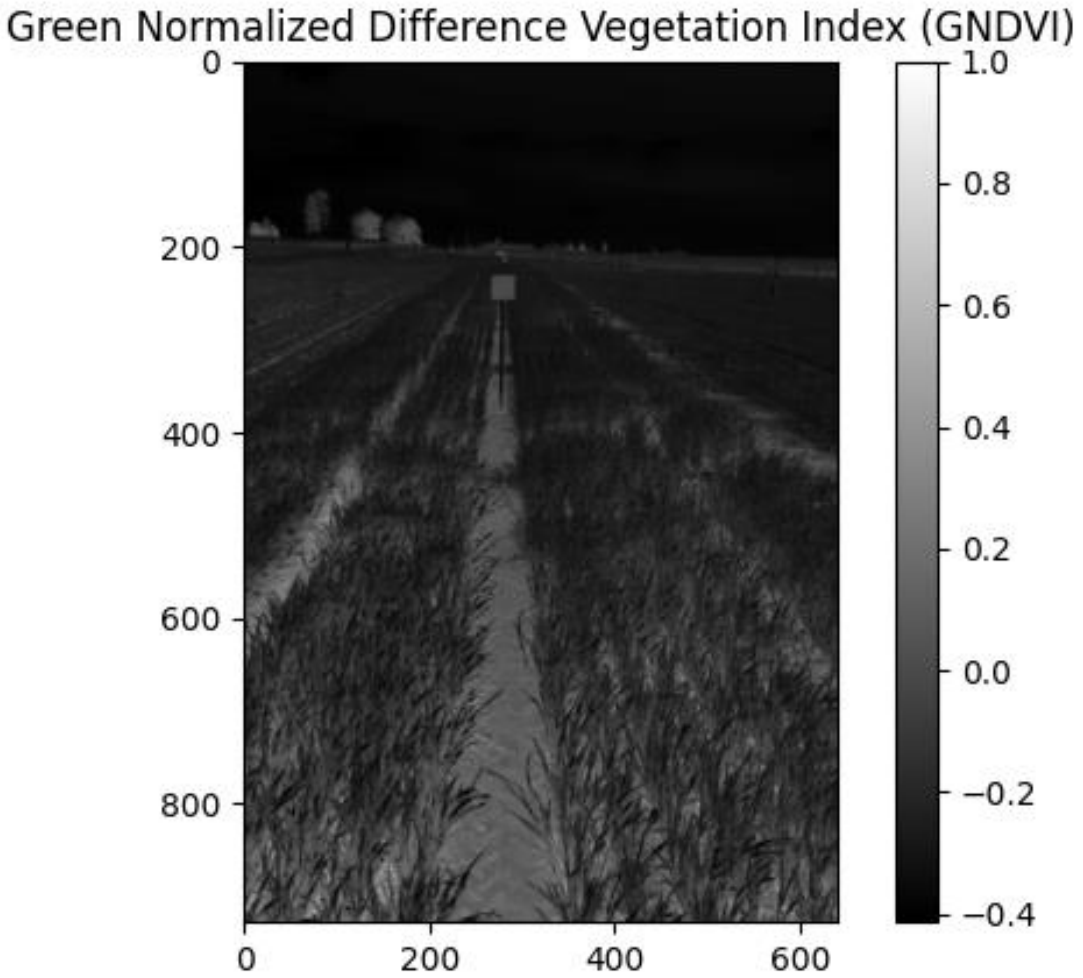
- Segment gray reference panel from the image
- Use it calculate reflectance (pixel value/average value of gray panel) to eliminate variation in sun light intensity
- Perform radiometric calibration (correct value of the images for each camera) to eliminate variations
- Calculate GNDVI and SCI at each 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

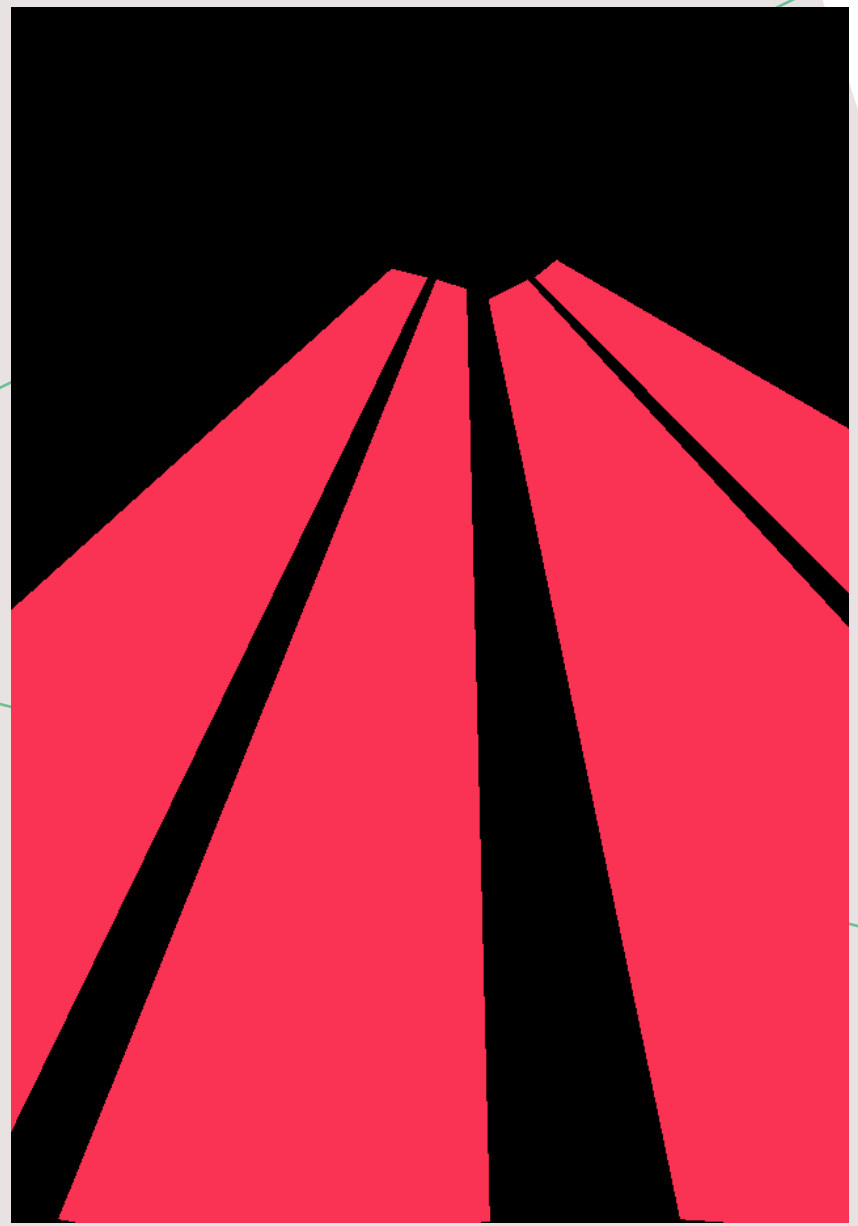
- You only look once (YOLOv8) – AI model
- Labels were created in makesense.ai website and exported as YOLO format
- Images were divided into training (70%), testing (20%), and validation (10%)
- Based on the input image and label, model got trained.
- From the center of gray panel, a square area of 11 x 11 was selected and average value was calculated

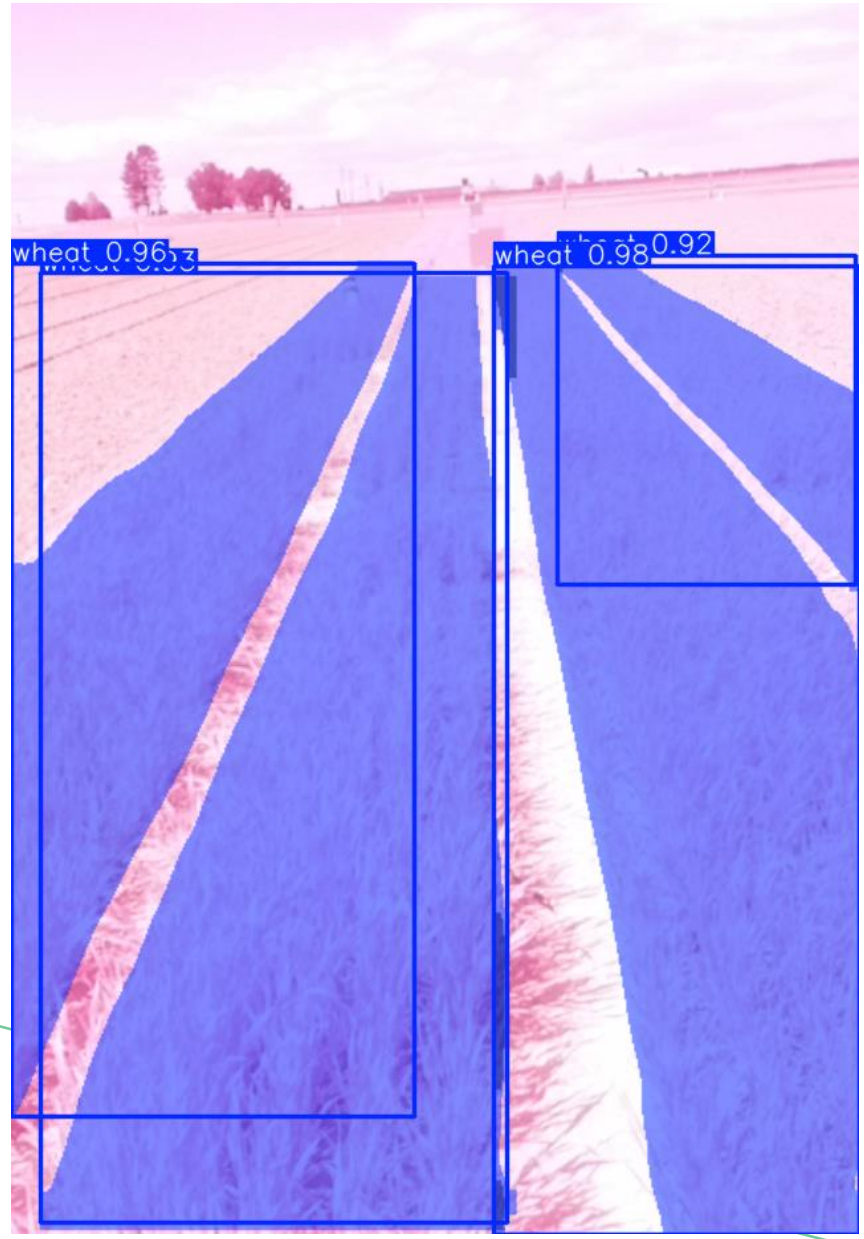


SEGMENTATION OF WHEAT FIELD

- GNDVI images were labeled using CVAT software
- Exported through the Segment mask 1.1 format
- Trained through YOLOv8 segmentation model

SEGMENTATION RESULTS



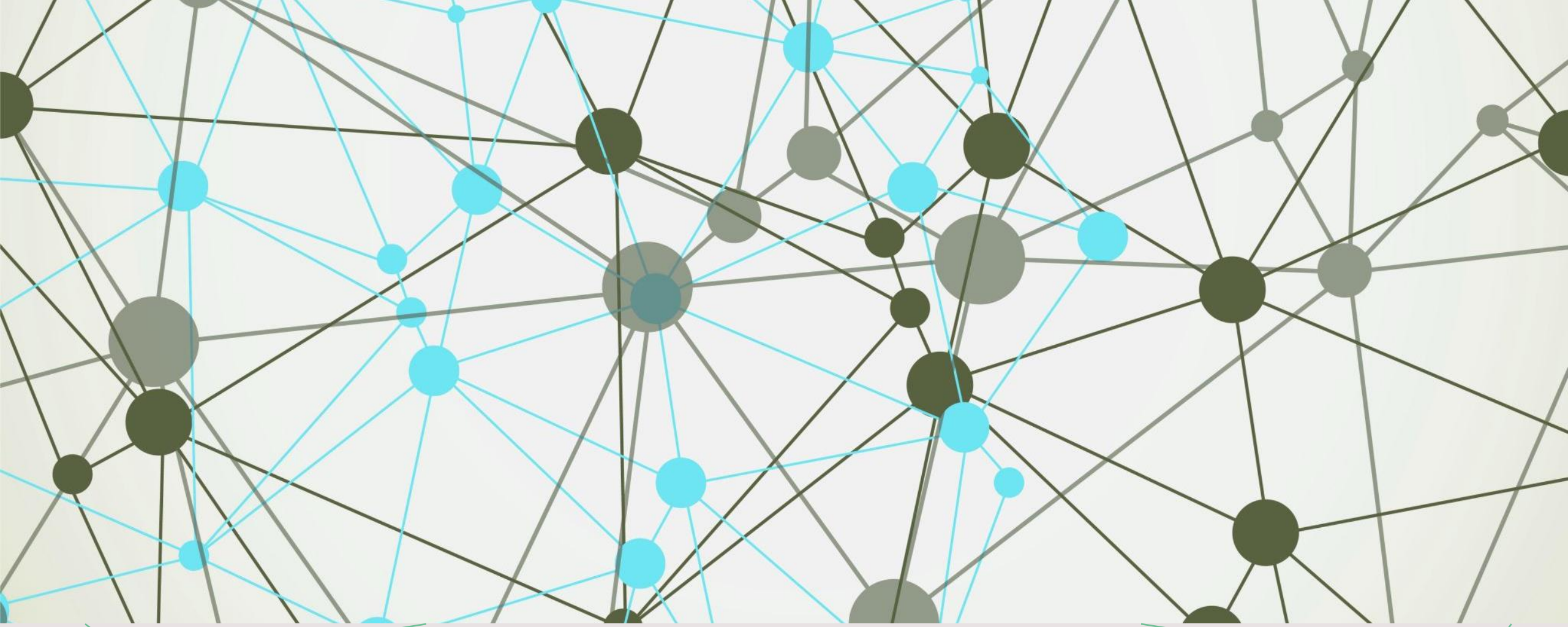


Metrics	Precision	Recall	mAP@0.50	mAP@0.50-0.95
Field	99.9%	100%	99.5%	90.1%
Panel	99.9%	100%	99.5%	93.8%

RESULTS CONT.

CONCLUSIONS

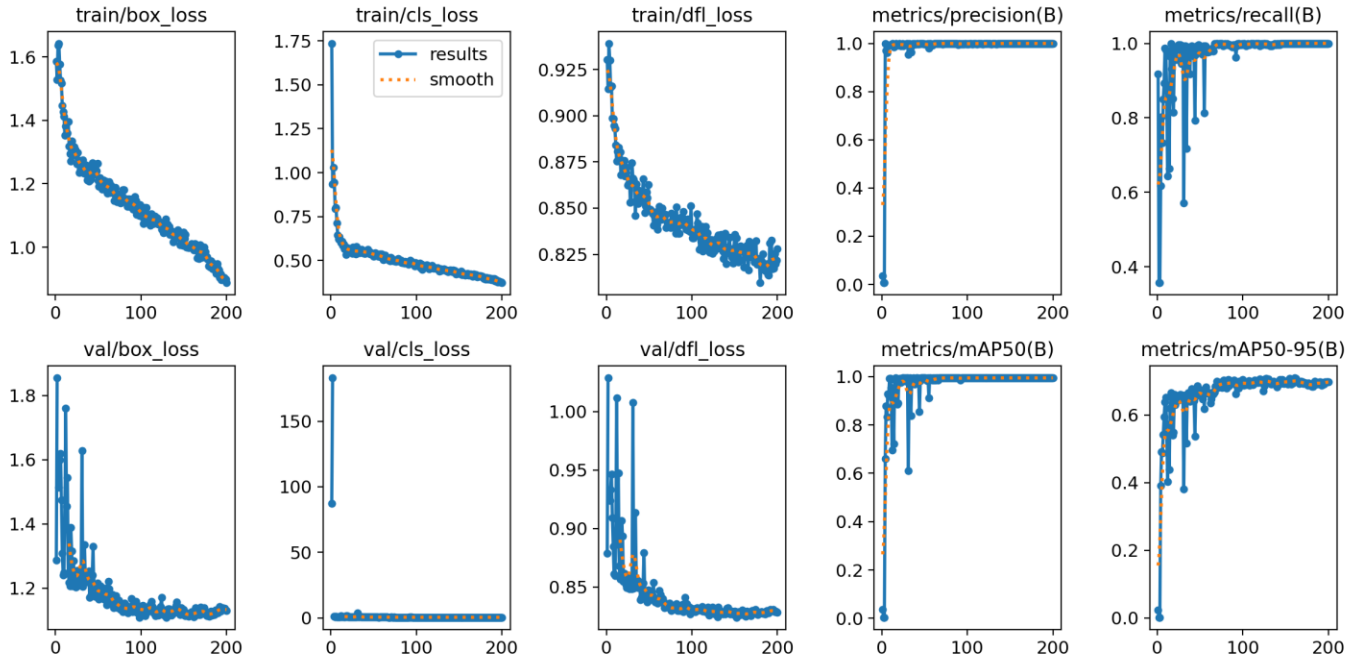
- AI model is robust in segmenting gray plate and wheat fields
- Further work is necessary to subdivide the wheat field into smaller plots
- In several plots, it is hard to distinguish as there was a slush growth of wheat
- Heuristics could be used to subdivide the plots



THANKS!

RESULTS

Grey Reference Panel Detection Model



Wheat Segmentation Model