Using Deep Learning to Predict Optimum Crop Management Decisions

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Introduction

- On-farm experimentation
- Precision agriculture tools
- Crop response variability
- Spatial and temporal variability
- Predictive models
- Convolutional Neural Networks
- Semantic segmentation

Objective

To evaluate deep learning models to predict the optimum seed and nitrogen rates as well as the crop yield at the optimum rates

Methods

- Checkerboard style field trials
- Four cornfields in Illinois
- Six topographic derivatives + EC
- Opt. seed and nitrogen + yield
- U-Net based CNN
- Image-based data augmentation
- Leave-one-out cross-validation

Results

- Importance of independent training and validation sets
- Low power of generalization in new fields
- Need for more predictor variables and independent observations

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