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Using Deep Learning to Predict Optimum Crop Management Decisions

Tuesday, November 12, 2019

4:00 PM - 6:00 PM

Henry B. Gonzalez Convention Center - Exhibit Hall 1

Poster Number

1337

Abstract

Recent advances in other areas have been incorporated into statistical models to explain how complex relationships between environmental characteristics and management decisions affect crop yields. Artificial neural networks are becoming the state-of-the-art in many such tasks. Architectures with many hidden layers and shared weights (convolutional layers) have been proven to be especially useful to model complex relationships such as the ones observed in agricultural systems. However, the interpretation of these models is not straightforward and the performance of the model in new fields is questionable. Therefore, the objective of this work was to evaluate deep learning models to predict the optimum seed and nitrogen rates as well as the crop yield at the optimum rates. The optimum rates were obtained by the use of on-farm precision experimentation. Topographical variables and apparent electrical conductivity were used as predictors. The results showed that randomly selecting a validation set can lead to overestimating the

model performance due to a lack of independence from the training set. Overall, the generalization power when no data from the field was used for training the model was very poor. The limited availability of independent observations is probably the main limitation for improving model generalization performance. Data augmentation techniques and transfer learning are promising strategies to improve the results.

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