Machine Learning Driven Data Analytics for Soybean Stress Phenotyping

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Refreshments will be served at 3:30 pm in the Agronomy Hall common area

Machine Learning (ML) approaches are rapidly emerging and are being deployed at an unprecedented scale in agriculture to generate automated solutions with higher accuracy. ML methods are versatile tools that can assimilate large amounts of heterogeneous data and provide reliable solutions to complex problems, such as in plant stress phenotyping. Our team is deploying ML tools to analyze image based plant stress data from complex and integrated phenotyping platforms, including unmanned aerial vehicles, unmanned ground vehicles and smartphones for identification (type of foliar stress), classification (low, medium, or high stress), quantification (% stress severity) and prediction (early stress detection), the ICQP paradigm, of stresses to generate insights that were previously not possible. We are also utilizing Deep learning (DL) for automated feature extraction from images to circumvent hand crafting (labelling) of images and provide “explainability” of key features utilized by DL methods to improve user confidence on a hitherto ‘black box’ approach. Finally, the applicability of the learned model was projected on non-soybean stress images to test and validate transfer learning, which opens up exciting opportunities. ML and DL driven data analytics provide new tools to researchers and producers for plant stress phenotyping.