The completion of my Master's degree marks the end of five years here at Purdue University. I came here for my undergraduate degree in 2014, and when I finished my ABE Bachelor's in 2017, I liked it so much I decided to stay for another year and a half. It's been a wonderful time here, and I'm looking forward to a bright career as a data scientist.

Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: **Jeff Fiechter**

Title: **Digital Soil Mapping: Developing and Testing a Machine Learning Based Field Soil Mapping Tool**

Major Professor(s): **Dr. Dharmendra Saraswat**

Date: **Thursday, July 18, 2019**

Time: **11:00 AM**

Location: **Lilly 3-102**

Abstract:

Soil property variability is one of the important components of the overall environmental variability that Precision Agriculture practices seek to address. Thus, the creation of accurate field soil maps from field soil samples is of utmost importance to practitioners of Precision Agriculture. Today, growers often interpolate their soil maps in a "black-box" fashion, and there is a need for an easy to use, accurate method of interpolation. In this study, current interpolation practices are examined as a benchmark and contrasted with a Machine Learning (ML) based prediction framework that utilizes publicly available digital elevation model (DEM) data to aid predictions. In the prediction of soil percent organic matter (OM), both grid and ordinary kriging predictions performed worse than the field average, and the ML framework performed better than them all while utilizing a high resolution (1.52 m) DEM. The results suggest that using current interpolation methods blindly is a dangerous endeavor, and that a ML framework using public data can make sound predictions and still be user friendly. Finally, the ML framework was made available for public use via creation of a webtool.

Application:

This work examines how growers create soil maps today and presents an improved method of interpolation. As field soil maps form the basis for millions of acres of variable rate treatments, the development of higher quality soil maps directly impacts the efficacy of Precision Agriculture.