Near Real-time Decision Making Under Uncertainty for Disease Mapping, Monitoring, and Prediction

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Disease mapping, prediction, and management are based on the appropriate data. Farmers are under tremendous pressure to adapt their decision-making to not only changing climate but also due to resource scarcity (e.g., water), reducing arable lands, and crop diseases. Traditional forecasting systems are based on assumptions about pathogens' interactions with the host and the environment. On the other hand, Remote sensing data plays an important role in mapping crop health over time and provides an opportunity to build machine learning-based forecasting systems. By integrating diverse datasets such as weather, local sensor measurements, and on-demand remote sensing data (e.g., UAVs), one could hope for more accurate and timely predictions for farmers with actionable spatial and temporal knowledge (where, when, and by how much) about water, fertilizers, and pesticides. We present ongoing work on incorporating in-situ and remotely sensed measurements into machine learning models, in particular models for making decisions under uncertainty. We will discuss opportunities for integrating this framework with farm equipment (tractors and UAVs) to generate near-real-time actionable knowledge for farmers.