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Agriculture Analytics to Decarbonize our Food and Energy Needs

Abstract

To feed an exponentially growing population with limited natural resources and increases in extreme weather events (such as hurricanes, floods, droughts, and rising sea levels), we will need more efficient, sustainable, and resilient farms. A promising technology with the potential to revolutionize the agricultural sector amidst these grand challenges is the use of data analytics, machine learning and artificial intelligence for data-driven decisions in agriculture. American farmers are equipped with technologies that are capable of gathering an immense amount of data about their fields and their production through satellite, aerial and ground sensors. Yet, agriculture ranks last among major US industrial sectors in its use of digital assets. Hence, there is a clear critical need for translational research in the intersection of agriculture and data analytics.

Research in the Intelligent Data for Energy and Agriculture Logistics and Supply Chains (IDEALS) Lab lead by Dr. Jones, aims to improve resource allocation in agricultural food and energy systems through operation research approaches coupled with data science techniques to mitigate missed opportunities in agricultural efficiency, sustainability, and resiliency. This in turn, improves rural economies while reducing negative environmental impacts. This presentation will summarize data-driven research projects at two different scales, at a national and regional level. At a national level, the discussion will revolve around how our agricultural and forest landscape could support a sustainable bioeconomy that decreases our reliance on fossil fuels and reduces climate change while efficiently producing food, feed, fiber, and fuel. At a regional level, the discussion will focus on the challenges of one of the most profitable crops in North Carolina through data collection, processing, storage, management, analysis, visualization, and interpretation paired with stakeholder engagement and how data analytics could increase process efficiency and reduce food waste.

Biography

Dr. Jones is an Assistant Professor in the Biological and Agricultural Engineering Department at North Carolina State University and holds a joint-faculty appointment with Idaho National Laboratory. At NC State, Dr. Jones is also the Data Science Academy Director of Agricultural Analytics; Director of the Agricultural Data Science Certificate; Office of Research and Innovation Faculty Fellow; Graduate Faculty of the Operations Research Program; Faculty Fellow of the Center of Geospatial Analytics; Faculty Affiliate of the Southeast Climate Adaptation Science Center; and Faculty Affiliate of the Agricultural Biotechnology In Our Evolving Food, Energy, and Water Systems NSF Research Traineeship Program. Dr. Jones develops large-scale heterogeneous and geo-temporal data-intensive models to better understand and enhance the sustainability of intensifying agricultural systems. Particularly, she analyzes the feasibility of harvesting, pre-processing, storing, and delivering agricultural waste for conversion to energy in efforts to reduce the anthropogenic impacts to the environment. Additionally, she works with industry to process data collected from gene expression to management practices to ground-based sensors (such as soil moisture sensors) to drone imagery to weather stations to satellite

sensors during planting, growing, harvesting, and packing to identify the factors that affect produce yield expressed as quantity and quality.

She earned her PhD in Biological and Agricultural Engineering with a concentration on energy systems from Texas A&M University, where she was an Alfred P. Sloan Scholar and received a certificate in Business Management. She received her Masters and Bachelor of Science degrees in Industrial Engineering with an emphasis in operations research and a Minor in Mathematics from Mississippi State University. She interned at Idaho National Laboratory and collaborated with multidisciplinary teams at Oak Ridge National Laboratory through her work on biofuels and renewable energy. Before this role, she was a postdoctoral associate at Duke University, where she performed quantitative and qualitative research on student interventions and supported programming of educational, career development workshops and community development events for underrepresented undergraduate and graduate students in the biosciences.