Stanford University
August 18th, 2023

ANALYZING THE IMPACT OF ENVIRONMENTAL VARIABLES TO PREDICT AGRICULTURAL YIELD AND IDENTIFY OPTIMAL PROACTIVE ACTIONS

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RESEARCH ABSTRACT

Agricultural practices around the world are negatively impacted due to the adverse effects of climate change. Agricultural yield is dependent on environmental factors such as rainfall, temperature, and humidity. Reduction in agricultural yield impacts millions of farmers and farm workers, resulting in a shortage of essential food supplies for consumers.

The objective of this research project is to use measurements of environmental variables such as rainfall, temperature and humidity in order to predict agricultural yield and optimize the yield by prioritizing proactive assistance such as increased irrigation or fertilizers. The cost of implementing proactive actions was compared with the expected gains in order to identify optimal recommendations.

Machine learning models were trained using historical data to perform predictive analysis of the impact on agricultural yield. Proactive actions such as increasing irrigation or using fertilizers were identified using machine learning models. The key datasets used for the analysis of agricultural regions were referenced from the U.S. Department of Agriculture and the University of California at Irvine. The first phase of the project focuses on the State of Kansas, one of the largest agricultural production states in the United States being impacted by climate change. Future work on this project can expand the scope to other agricultural regions around the world.

To turn insights into action, this project focuses on using the Theory of Change framework to create the vision for change, define desired outcomes, and identify the necessary steps to achieve the desired outcomes. A diverse set of stakeholders including farmers, agricultural workers, and policymakers were considered in all phases of the research to ensure that the key stakeholders have a comprehensive understanding of the research project. Data about expected gains from the increase in agricultural yield was identified to ensure that stakeholders can understand the effectiveness of the proactive recommendations.