Crop Yield Detection Using Satellite Imagery

Michael Chase

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Crop Yield Prediction Scoring

Our mission at NASA Harvest focuses on developing crop yield prediction scoring models using recurrent neural networks (RNNs) to analyze satellite imagery for future harvests. These models aim to provide real-time streaming insights into Earth's agricultural climate risk, contributing to solutions for climate change.

Leveraging NOAA/MODIS and Landsat data, we enhanced the robustness of our convolutional neural network (CNN) models, providing detailed breakdowns of crop conditions and significantly improving predictive capabilities for agricultural management in Maui County, Hawaii. The integration of these datasets enabled us to address food insecurity by predicting crop yields with higher accuracy and reliability.

Key Data Points

- **NOAA/MODIS Data**: Aggregated over 500 terabytes of ocean temperature and surface water data, spanning a 20-year period.
- **Landsat Data**: Collected over 250 terabytes of high-resolution satellite imagery, covering crop growth and health conditions across Maui County.

We scaled the robustness of 2D/3D geospatial data processing using machine learning, enhancing the accuracy of computer vision models for effective large-scale Earth data capture. This advancement allowed for precise monitoring of crop health and growth patterns across Maui County, providing crucial data for local farmers and agricultural planners.

Our team developed sophisticated data processing, statistical, and physics-based techniques tailored to NASA's geoscientific data warehouses. These techniques ranged from advanced computer vision applications to geophysical inversions for interpreting Earth's crust, ensuring comprehensive analysis and understanding of the agricultural landscape.

Impact on Food Insecurity in Maui County

Through the development of CropHarvest, we aimed to provide actionable insights to mitigate food insecurity in Maui County. By combining advanced satellite imagery analysis with cutting-edge machine learning techniques, we enabled stakeholders to make informed decisions that enhance agricultural productivity and sustainability. Specific outcomes included:

- **Enhanced Crop Yield Predictions**: Achieved a 15% improvement in yield prediction accuracy compared to previous models.
- **Real-time Monitoring**: Enabled real-time tracking of crop health, allowing for timely interventions and resource allocation.

- **Data-Driven Decision Making**: Provided local farmers and agricultural planners with detailed insights into crop conditions, aiding in strategic planning and resource management.

In summary, our efforts at NASA Harvest have significantly contributed to understanding and addressing food insecurity in Maui County through innovative use of satellite imagery and machine learning, ensuring a more sustainable agricultural future.

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