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# Enhancing Crop Yield Predictions with Drone Images and Machine Learning

Understanding and predicting crop yields accurately is vital for ensuring food security, especially as climate change increasingly affects agriculture. My research focuses on how we can use advanced technology—specifically drones and machine learning—to make better predictions about crop yields.

In this study, I used UAVs to capture high-resolution images of crops like winter wheat, spring wheat, and barley in South Sweden throughout the growing season. By analysing these images with sophisticated machine learning models, I aimed to see how well we could predict the yields of these crops. The models I used combined Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) networks, which are particularly good at handling both the spatial details and the changes over time that are present in the images.

The results showed that the predictions became more accurate as the season went on, especially as we got closer to harvest time. However, simply increasing the number of images (or the length of the sequence) didn't always make the predictions better. Also, models that were trained specifically on winter wheat didn't work well for other crops like barley and spring wheat, indicating that each crop might need its own specialized model.

These findings are important for farmers and policymakers. By knowing when and how to collect data, and understanding the need for crop-specific models, we can better utilize drone and machine learning technologies to predict yields. This can help in making more informed decisions about farming practices, ultimately leading to better food security and sustainable agriculture.

Keywords: Physical Geography and Ecosystem Analysis, crop yield predictions, machine learning, deep learning, UAV imagery, CNN-LSTM, sequential data

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