PROBES snapshot
Vision2Biomass, quantifying crop residue retention

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What is a probe?

PROBES are early-stage, safe-to-fail digital experiments launched under the Digital Transformation Accelerator to explore new tools and ideas across CGIAR. They are designed to test concepts in real contexts, learn what works and what does not, and generate insights that inform future design, prototyping, or scaling decisions.

Imagine it: Instead of inspecting fields to judge residue levels after harvest, you take a photo, and the AI records exactly what type of residue management is happening.

The promise

Accurate residue measurements are essential for carbon accounting, climate reporting, and understanding sustainable farming practices. Today, residue retention is typically identified manually, which is slow, inconsistent, and difficult to scale across large farming regions. For CGIAR and decision-makers, the ability to quantify residue using simple field photos could dramatically improve monitoring systems and provide farmers with feedback that supports climate-smart agriculture.

What's innovative

This probe applies frontier computer vision and AI image segmentation techniques to process photos of rice fields and classify practices such as full burn, partial retention, or no burn. The innovation lies in the combination of geotagged field data, machine learning models, and spatial validation layers to create a potentially automated pipeline for carbon and sustainability monitoring.

What we did and learned

Still in progress, the probe has advanced through annotating photos into residue categories, training segmentation and classification models, and validating the results with ground-truth data, resulting in a robust technical workflow with measurable outputs. The model successfully identifies residue categories, although its accuracy varies across field conditions due to limited labeled data, lighting variations, and interference from green grasses. It can even distinguish between burned residue and natural dry patches, highlighting its potential to support scalable, automated residue monitoring using digital tools rather than manual field measurements.

What's next

- Expanding the training dataset across different agroecological zones
- Integrating field images with satellite and drone data to enhance accuracy
- Developing a full prototype to scale in rice-growing regions

SDG alignment

Submit a probe

Are you a working with an emerging digital technology that might contribute to CGIAR's 2030 outcomes? Would you like to try this in a safe-to-fail environment?

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