

A super-ensemble approach to map land cover types with high resolution over data-sparse African savanna landscapes



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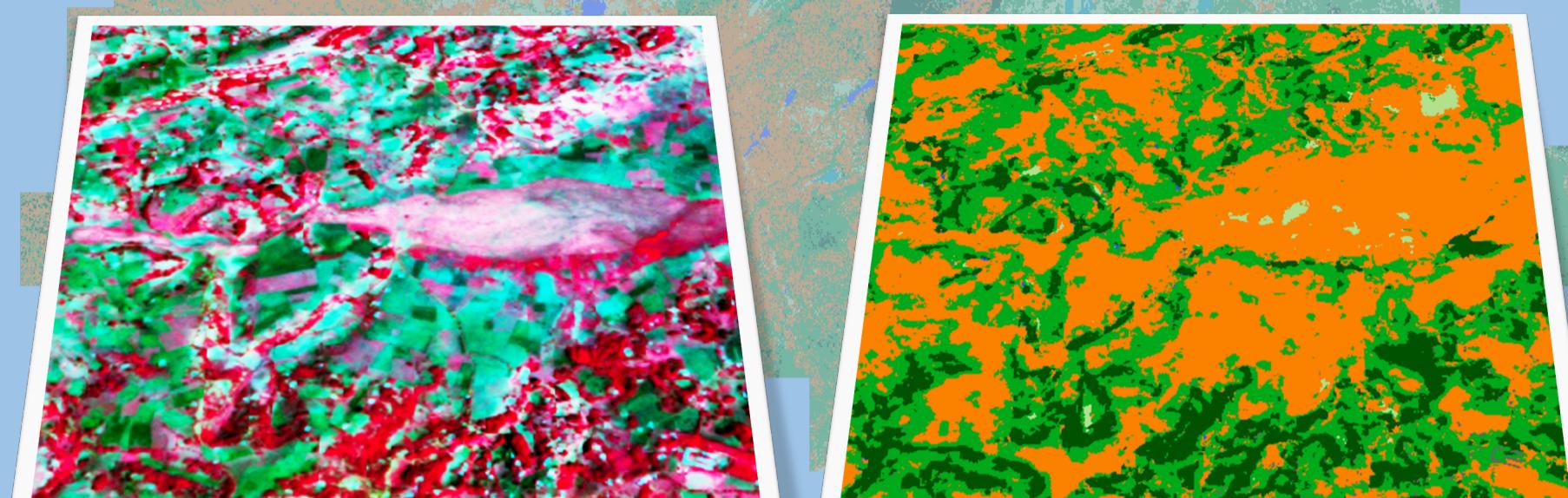
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Introduction

Accurate and timely land cover products are critical inputs for landscape planning, and in turn provide key information for biodiversity conservation and food security. However, poor mapping quality and low resolution are considerable issues in existing land cover maps over the African savanna, where land use is complex and changing rapidly and necessary ground-truth data are sparse and hard to obtain. We proposed a method to make timely and accurate land cover maps in data-sparse regions.

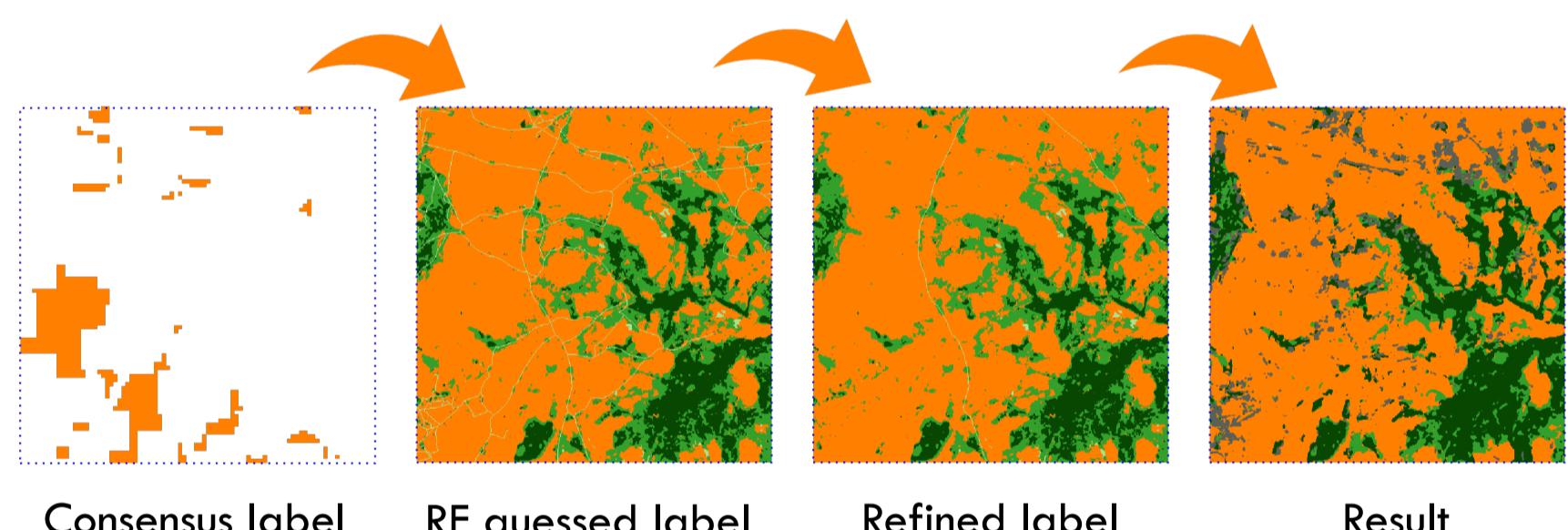
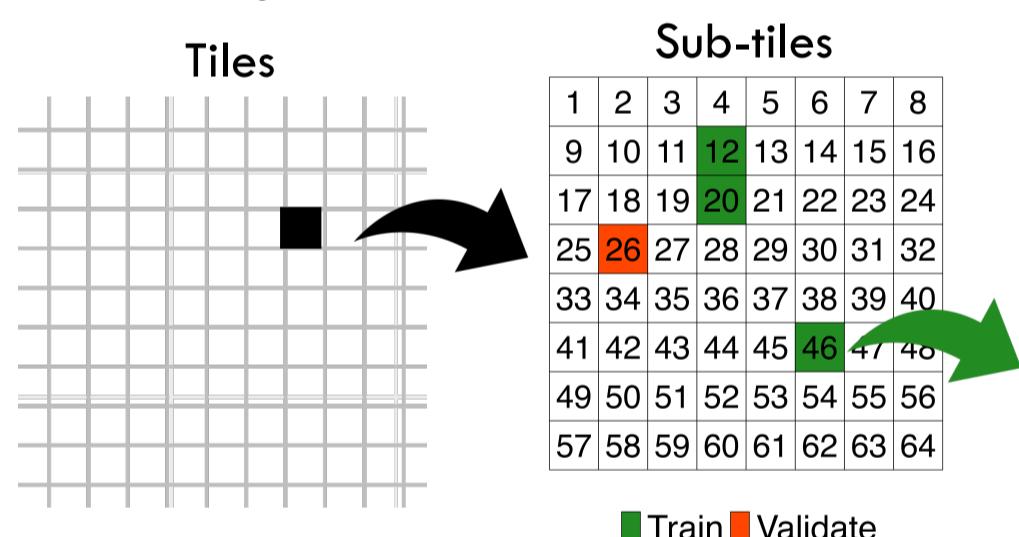
Humans and Artificial Intelligence label together for land cover mapping

Label this from scratch? OR Just modify this?



Methodology

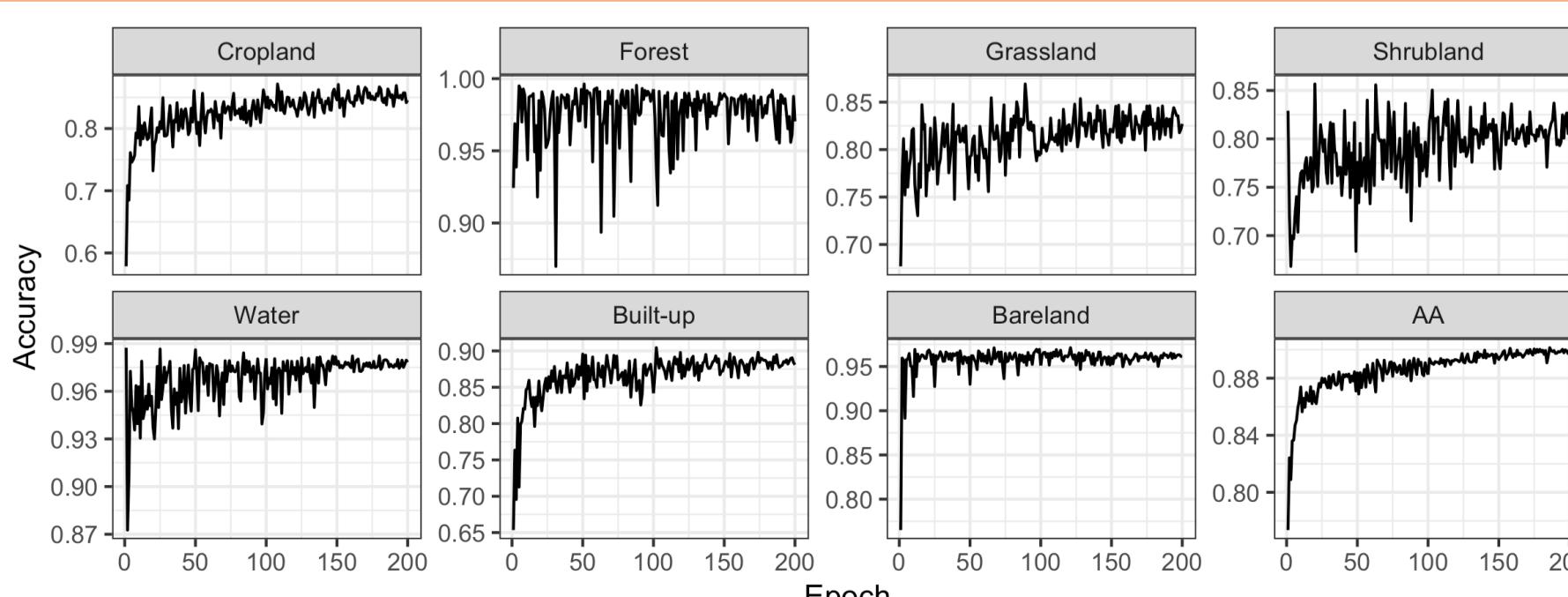
- 1 Extract the consensus of multiple existing land cover products to generate fragmented pixel-wise training labels.
- 2 Translate pixel-wise training labels to image-wise labels using the random forest as a guessing model and satellite images.
- 3 Fine-tune a U-Net network based upon these image-wise labels using Sentinel-1 time series and raw bands of NICFI basemaps as image features.



Results

Taking Northern Tanzania as case study, the results demonstrate the usefulness of an approach to ensemble existing land cover maps and do land use classification over data sparse savanna landscape. The U-Net model gets overall accuracy 83.57% and kappa 0.78. The proposed idea can fairly be applied to other scales (e.g., global) or other data sources (e.g., Sentinel-2).

Landcover	Confidence
Cropland	81.27 ± 15.10
Forest	83.95 ± 17.48
Grassland	82.82 ± 17.12
Shrubland	82.56 ± 16.68
Water	94.89 ± 12.18
Built-up	70.11 ± 18.41
Bareland	79.93 ± 18.62



Shared resources

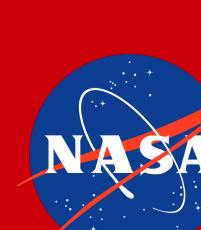
- ❖ <https://github.com/LLeiSong/hrIcm>
- ❖ <https://github.com/LLeiSong/sentinelPot>

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Acknowledgments

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