# Extracting field boundaries from satellite imagery with a convolutional neural network to enable smart farming at scale

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The number of digital agricultural services providing field-level information to farmers is sky-rocketing. Field boundaries need to be drawn manually by growers upon subscription. Using deep learning, We seek to automatically extract field boundaries from satellite images and as a result facilitate onboarding of growers.

We developed a multitasked semantic segmentation approach [1] that predicts four outputs from satellite images:

- Field extent
- Field boundary
- Distance to the closest boundary

which are then post-processed to extract individual field boundaries.

Our method showed good performance in a test site in South Africa [2].

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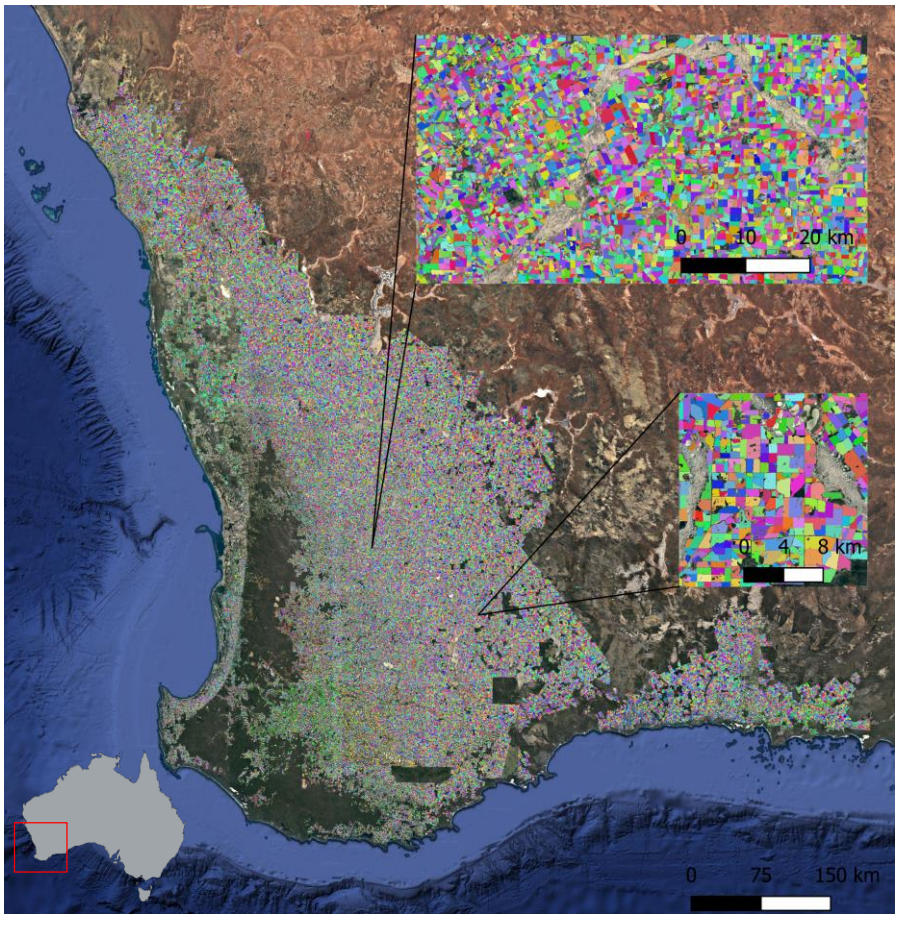
|---|---|
| 91% | Overall accuracy |
| 83% | Undersegmentation rate |
| 90% | Oversegmentation rate |

Our convolutional neural network learns complex hierarchical contextual image features to accurately detect field boundaries.

Without retraining, our method also generalised well across sensors (Sentinel-2, Landsat-8), resolutions (10 m, 30 m), space and time [2].

Given this generalisation ability, we are applying our method to Sentinel-2 data in Australia.

By minimising over-fitting and image preprocessing, our method facilitates the extraction of individual crop fields at scale.



Extraction of field boundaries across the wheatbelt in Western Australia

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[1] Diakogiannis, Waldner, Caccetta, & Wu (2020). Resunet-a: a deep learning framework for semantic segmentation of remotely sensed data. *ISPRS Journal of P&R$, 162*, 94-114.
[2] Waldner & Diakogiannis (2019). Deep learning on edge: extracting field boundaries from satellite images with a convolutional neural network. *arXiv preprint arXiv:1910.12023*.