



IADAS - L'IA appliquée à l'imagerie drone pour l'identification d'arbres

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SECTION 01

IADAS

Intelligence Artificielle pour Drones Autonomes et Satellites

IADAS

The objective of IADAS is to enable autonomous drones and NewSpace satellites to have large data processing capacities based on Artificial Intelligence.

Partners:

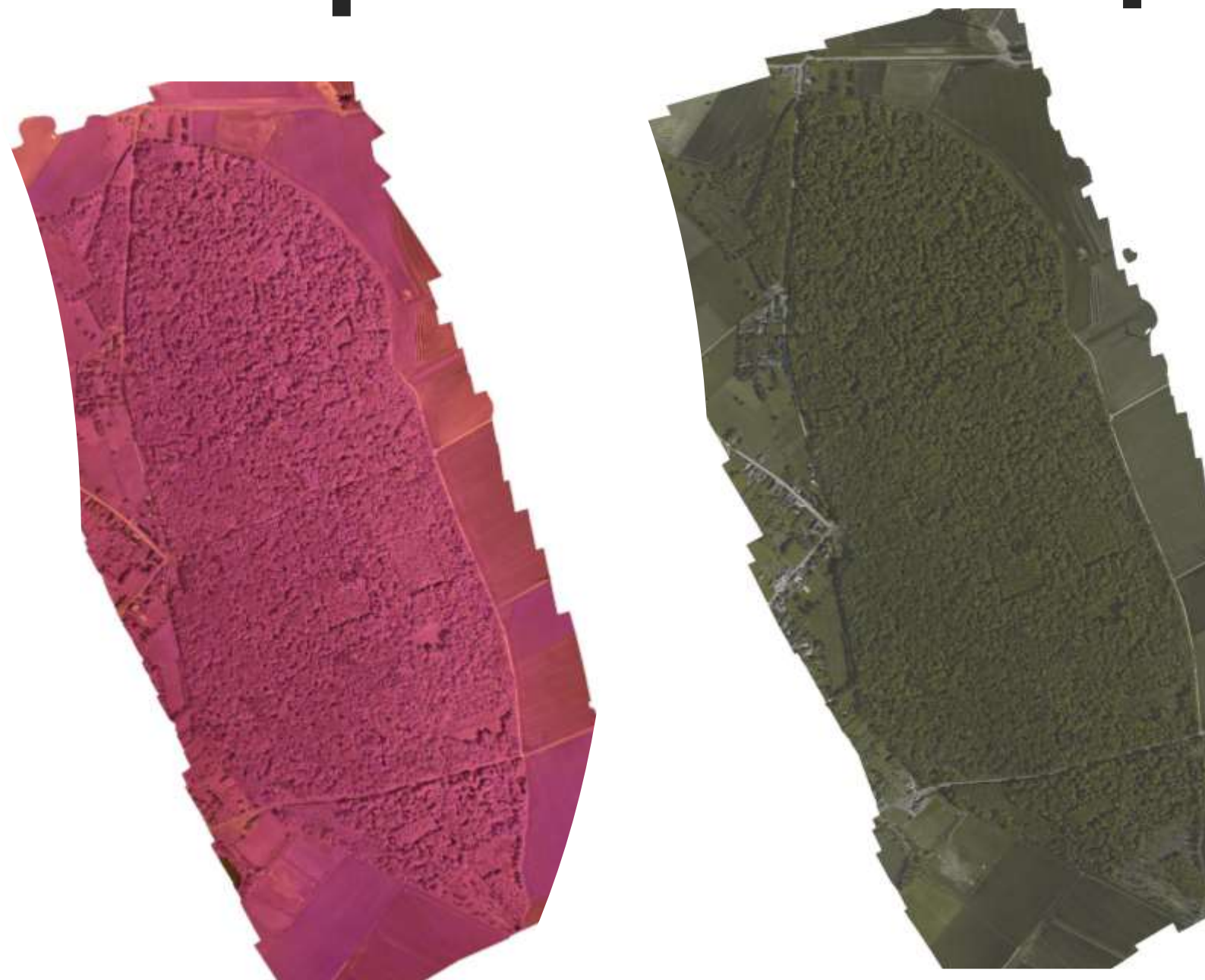


Project funded by Skywin – Walloon Region



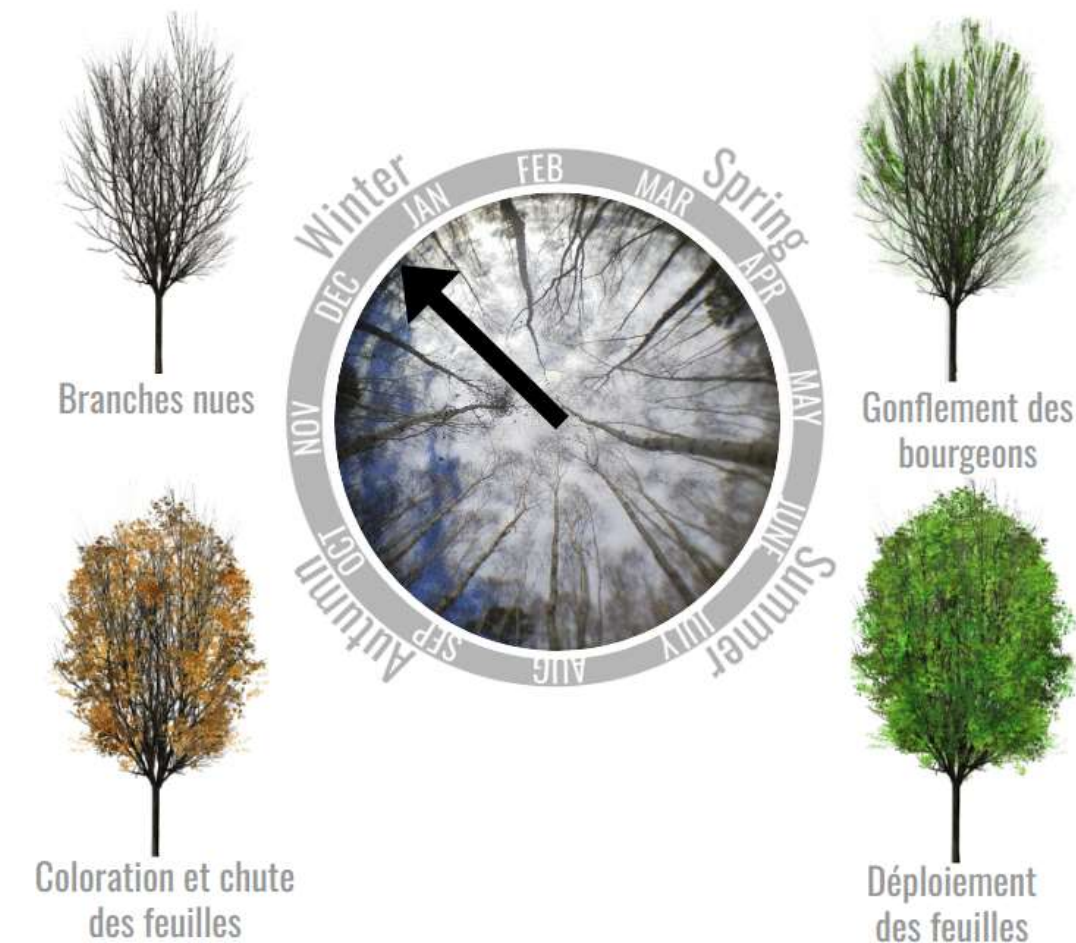
Wallonie

Identify individual tree and tree species based on EO in the optical and multi spectral domains



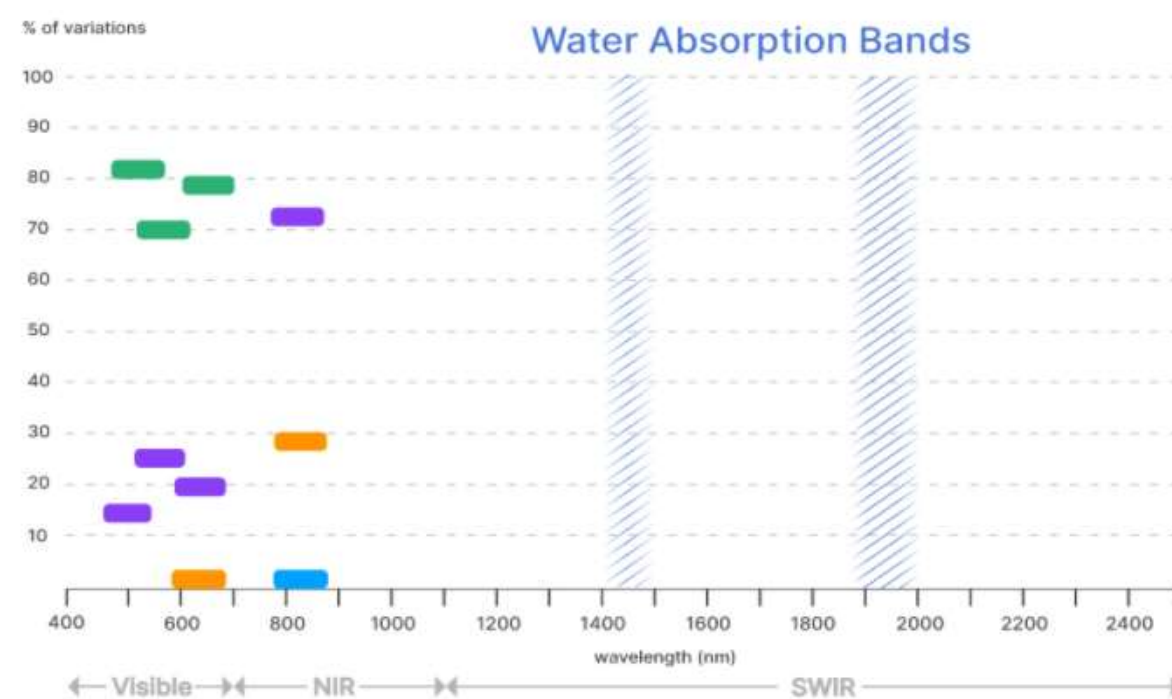
Spectre infrarouge
Bandes : IR, Red,
Green

Spectre visible
Bandes : Red Green Blue
(RGB)

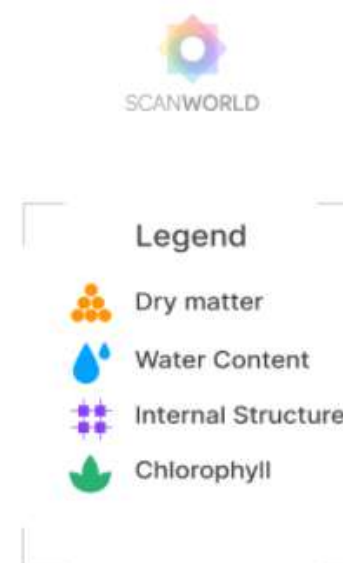
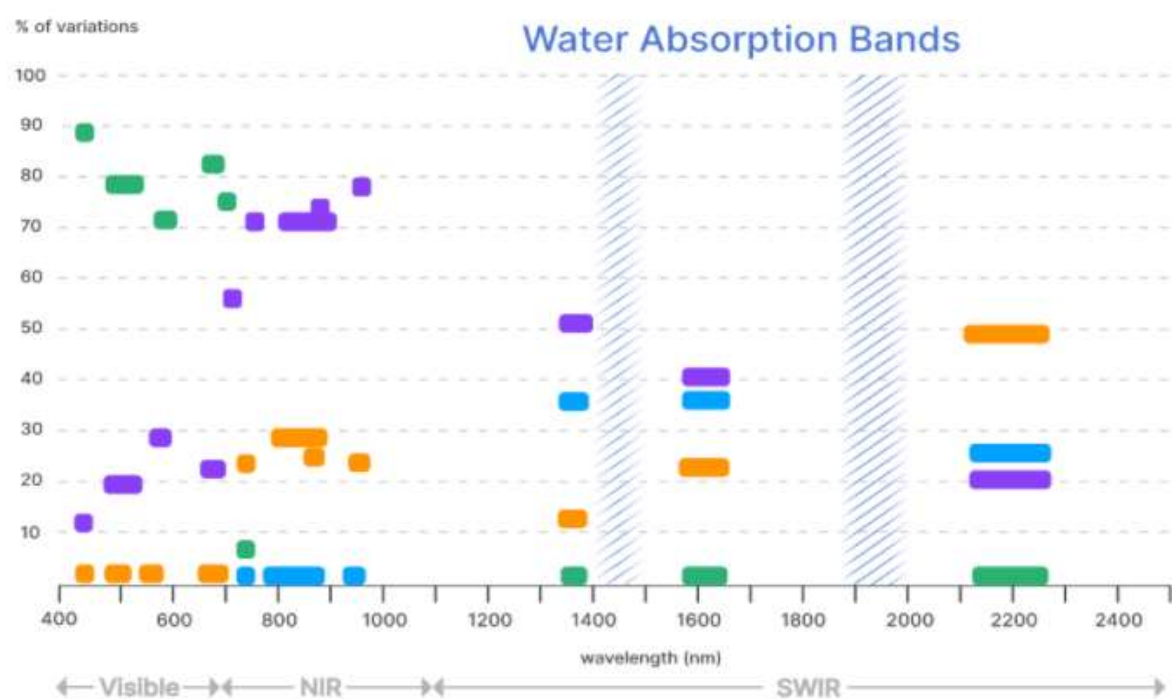


Identify individual tree and tree species based on EO in the optical and multi spectral domains

Spectre visible :
Bandes RGB



Spectre
infrarouge :
Bandes IR,
Red, Green

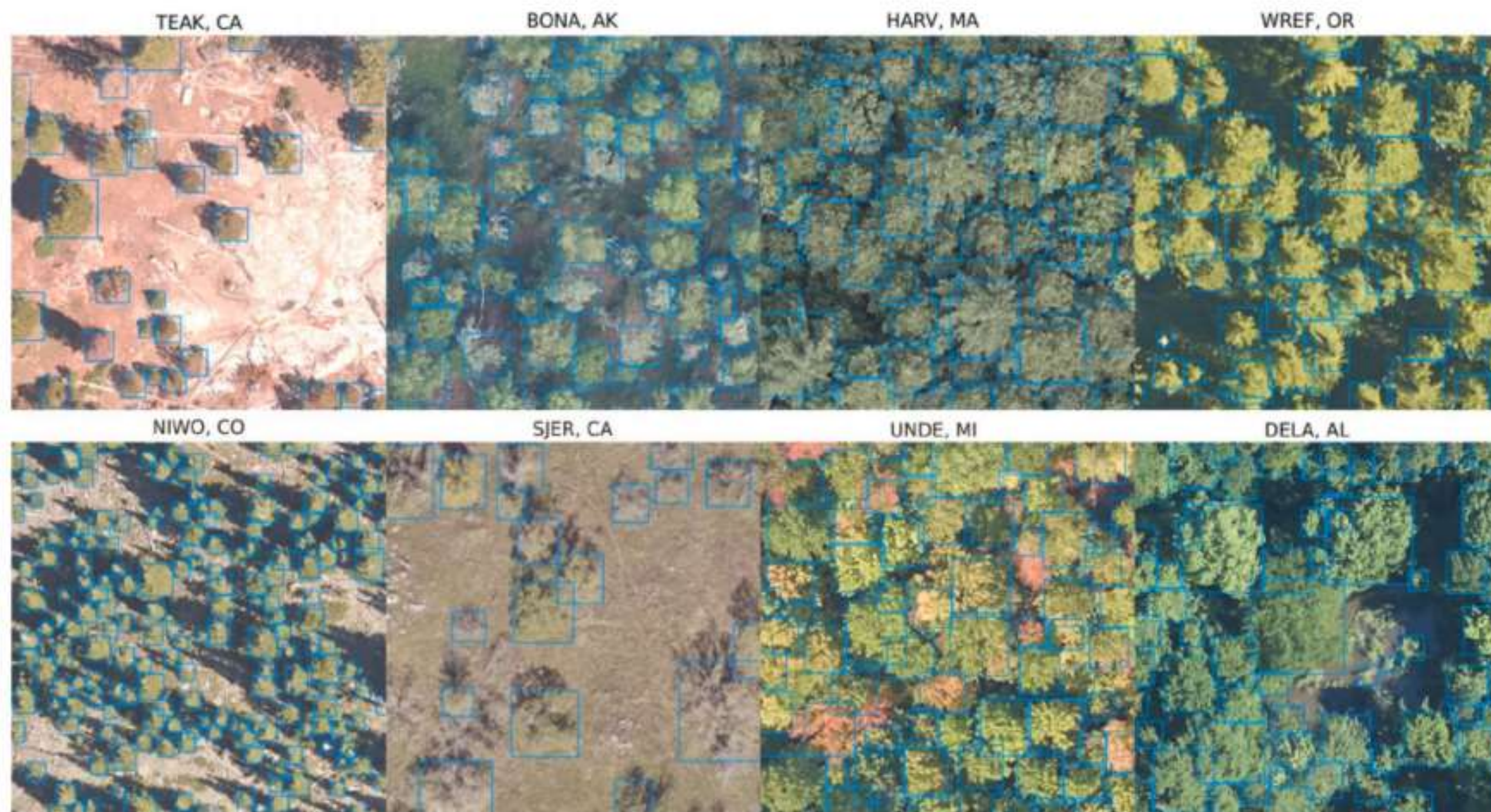


SECTION 02

Deep Learning Approach

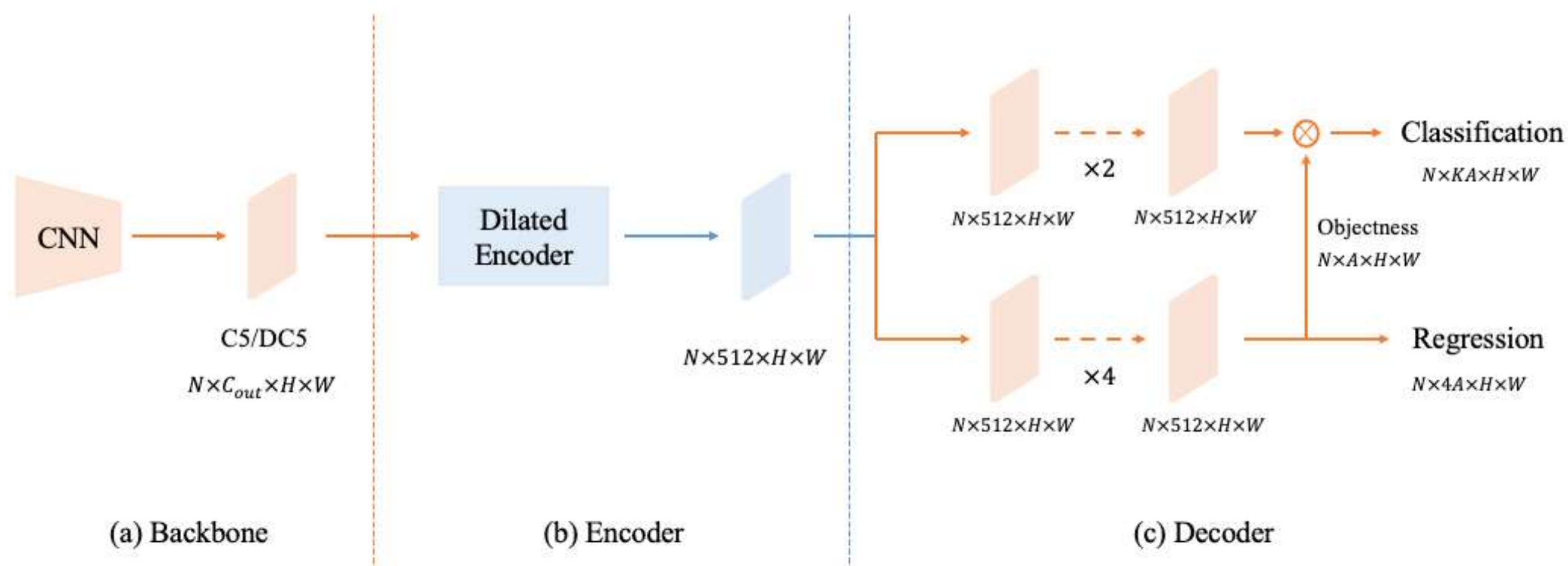
Tree detection

Testing SOTA deep learning object detection models
on NeonTreeEvaluation dataset



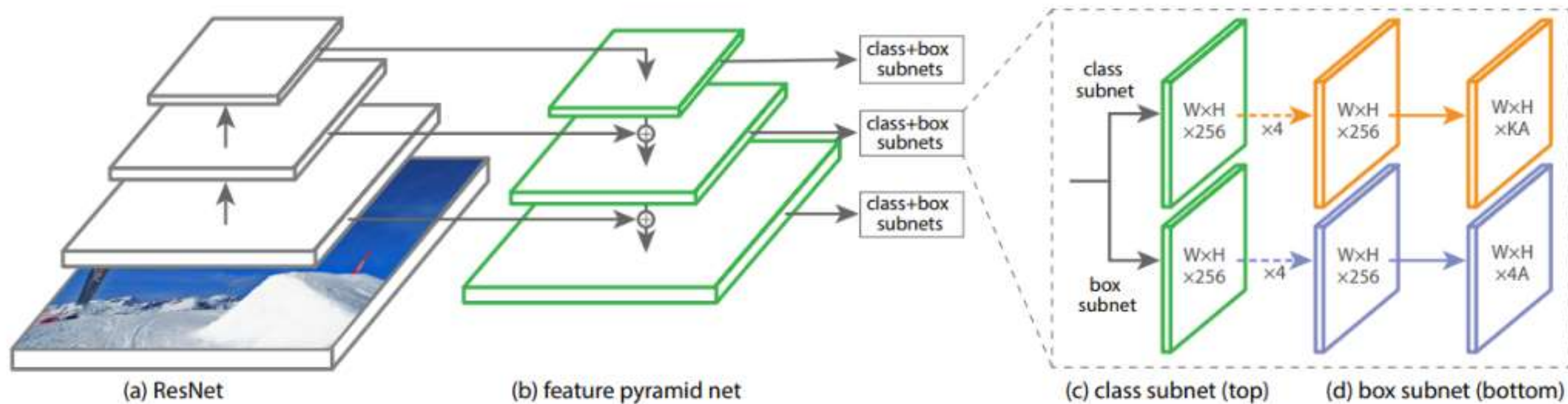
Tree detection

You Only Look One-level Feature (YOLOF), CVPR2021



Tree detection

RetinaNet with ResNet backbone

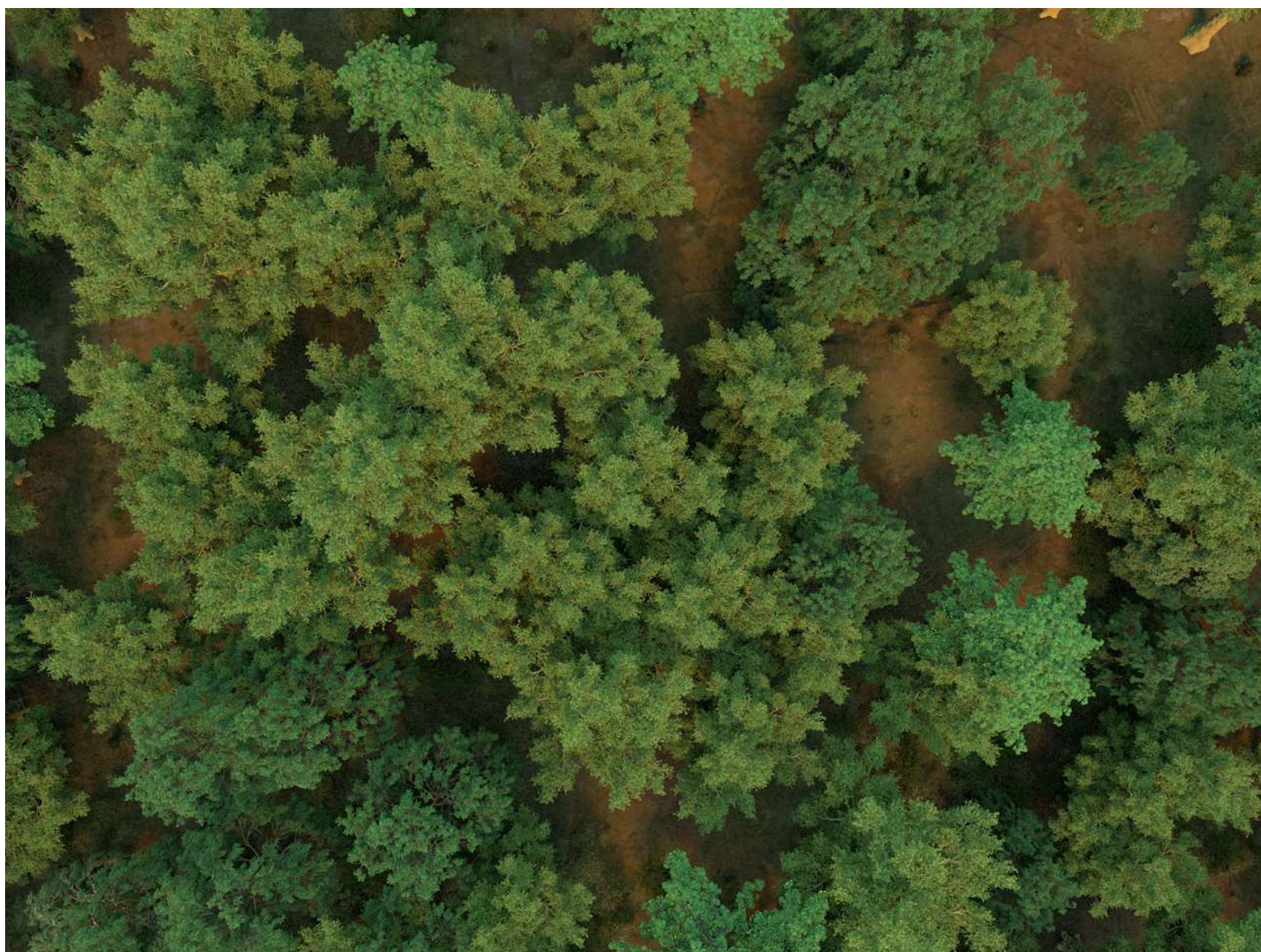


Tree detection

- Better than SOTA on NeonTreeEvaluation
- Poor results for very dense forest (challenging, even for human annotators)
- Huge network : computational complexity, requires large training dataset



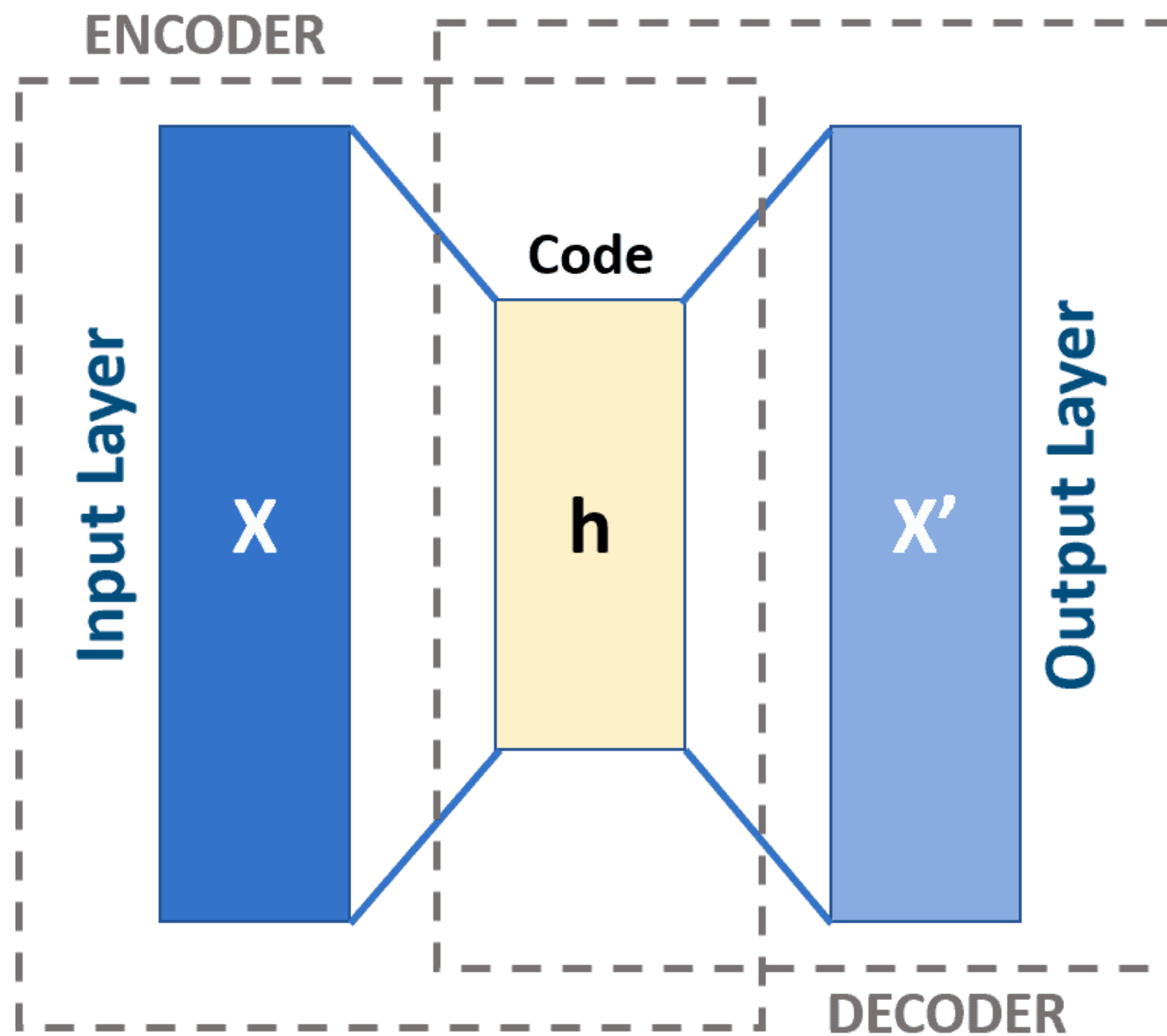
Tree detection



Synthetic dataset generation by Deltatec using expert knowledge

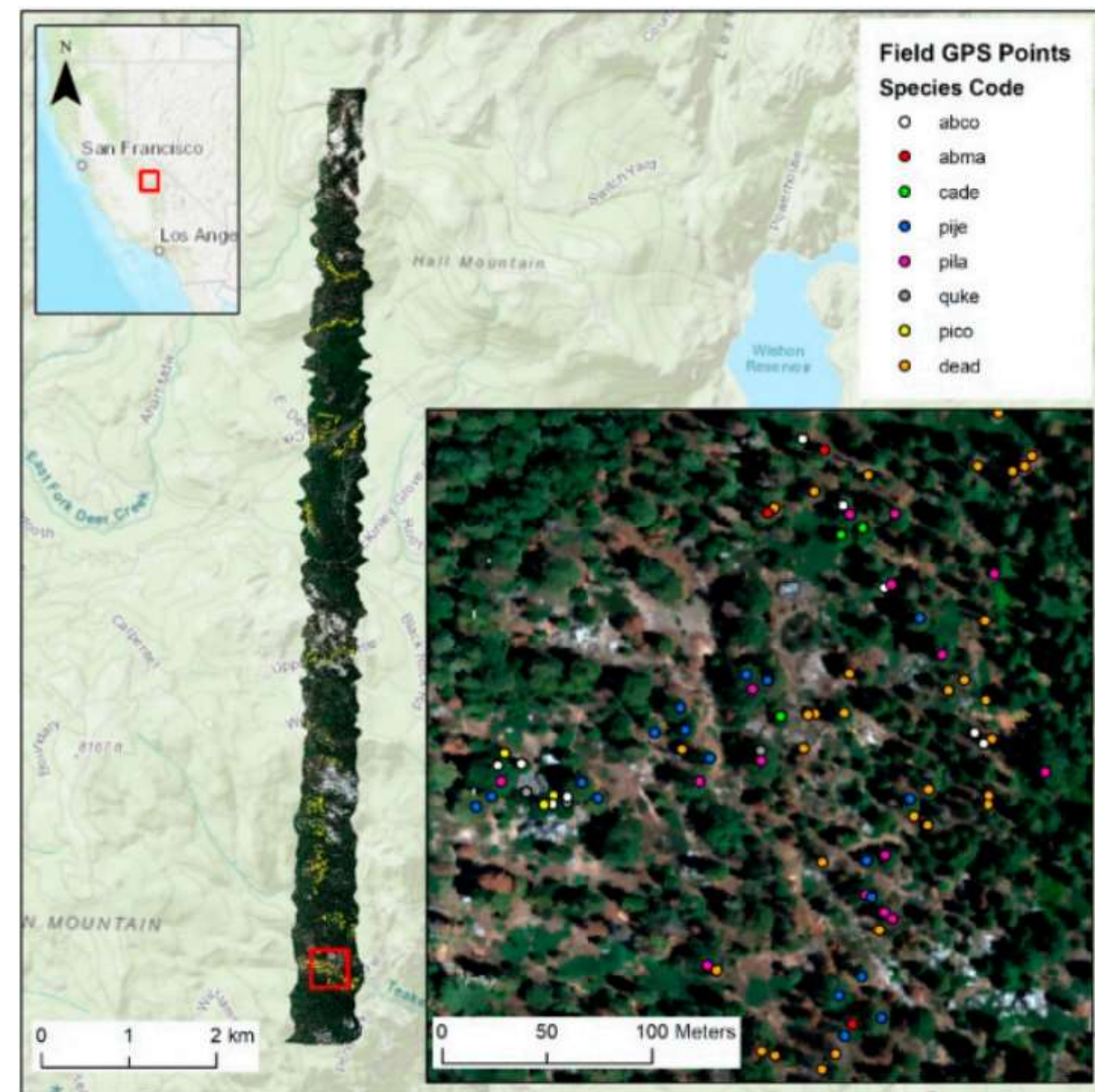
Tree detection

Autoencoder with Inception backbone



Species classification

Multiple deep learning architecture (MLP - CNN 2D – CNN 3D), and non deep methods on NeonTreeEvaluation dataset with 7 species



Species classification

Classification accuracy	CNN2D	CNN3D	CNN3D-1D	CNN3D-2D	MLP	Resnet	Siamese network	Random forest
Accuracy	0.84	0.88	0.84	0.90	0.86	0.83	0.78	0.75

- Best results : CNN 3D-2D (HybridSN-like) on hyperspectral data (Neon Tree Evaluation)
- Poor results with RGB data (accuracy 0.49)
- Work in progress : multispectral data



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