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► **To cite this version:**

Antoine Richard, Cedric Pradalier, Rosalinde van Couwenberghe, Vincent V. Perez. Automated recognition of habitat classes from overhead imagery. ILTER Network, Oct 2017, Nantes, France. hal-02573216

**HAL Id: hal-02573216**

**<https://hal.science/hal-02573216v1>**

Submitted on 11 Aug 2020

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# Automated Recognition of Habitat Classes from Overhead Imagery

Antoine Richard, Cédric Pradalier Rosalinde Van Couwenberghe & Vincent Perez

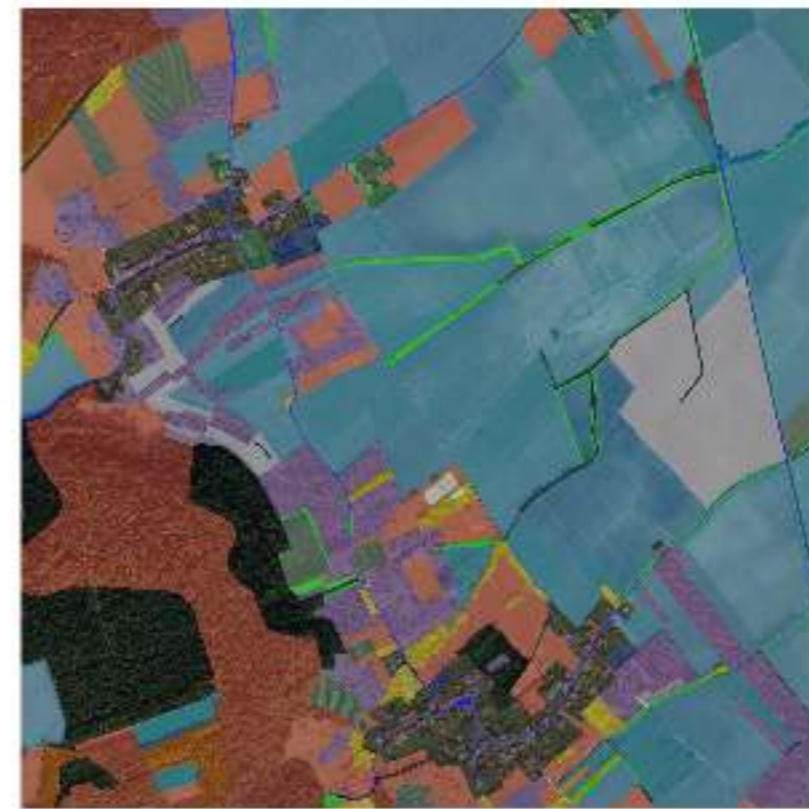
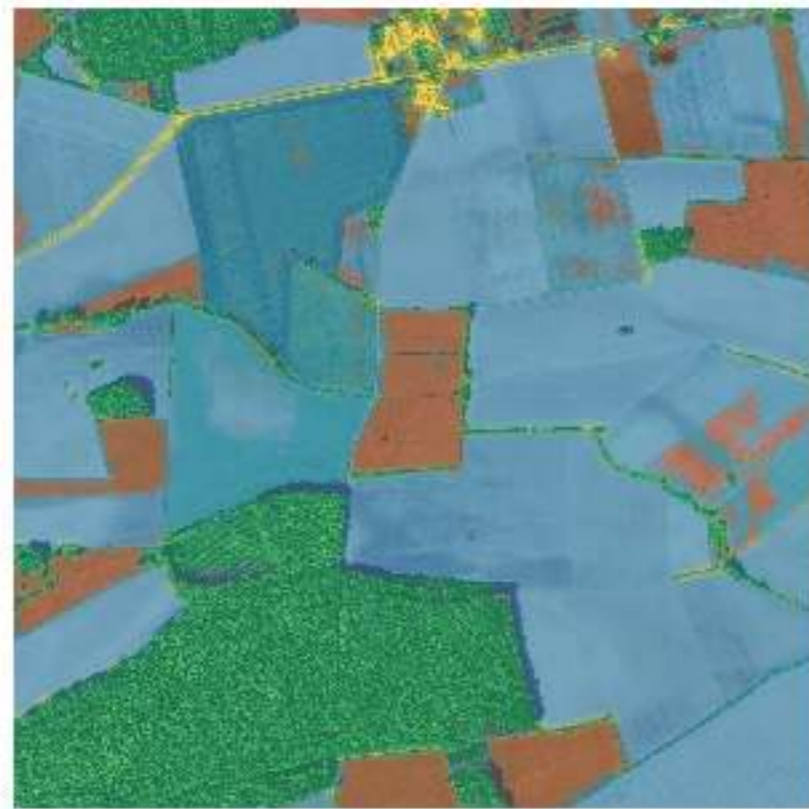
## Objectives

- Overhead imagery texture segmentation
- Human like habitat classification

## Approach

- Convolutional Networks for texture recognition
- Hybrid method for habitat classification

## Motivation: Overhead Imagery Analysis to Establish Ecosystemic Services



In red, example of class with a negative impact on the water quality: the farm lands.

In green, example of classes with a positive impact on the water quality: the forests

1 An area of study is chosen

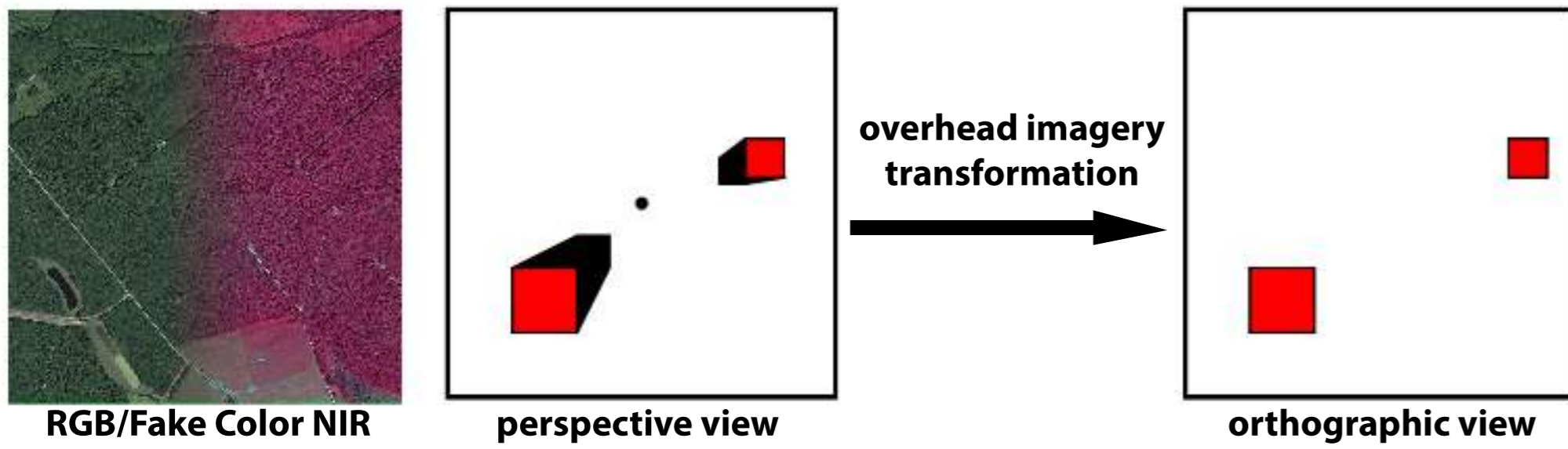
2 A Neural Network classifies the input images by texture types

3 A combination of neural networks and statistical tools are used to perform habitat recognition

4 Classification results can be used to predict water quality

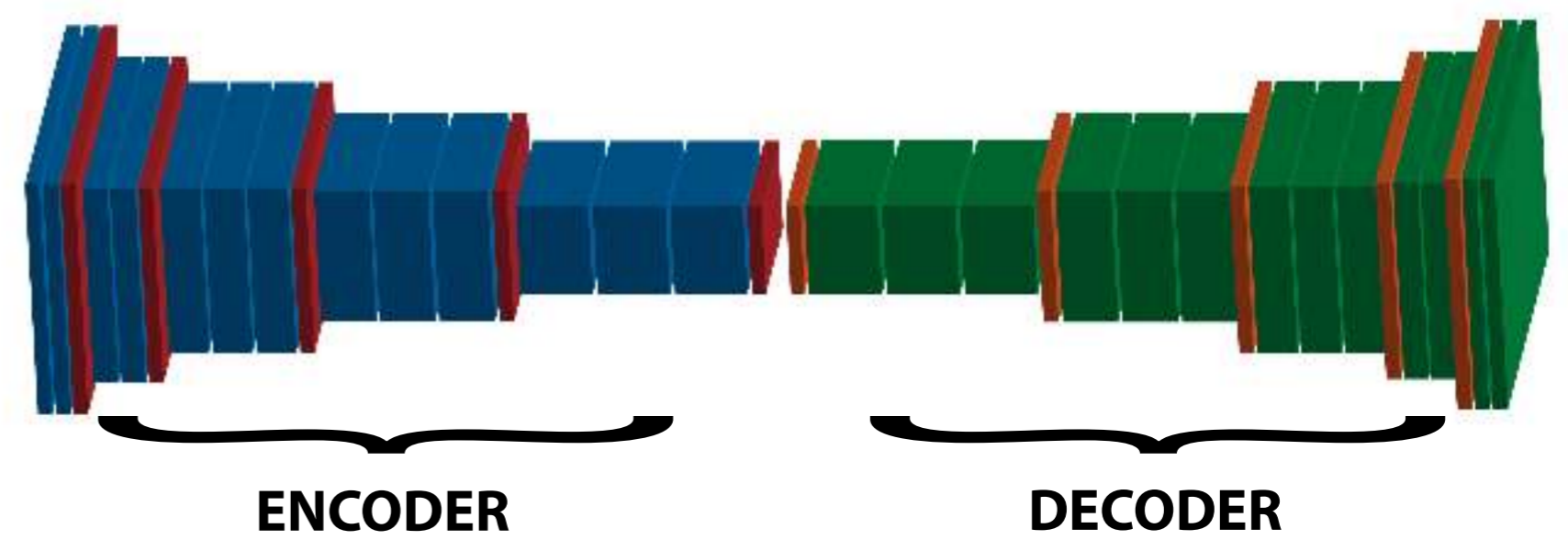
## Input Data

RGB-NIR 50cm/pxl resolution ortho-images



Other layers such as a digital elevation model (DEM), or a map of the roads and tracks are used when performing the habitat classification

## Automated Analysis using Deep Neural Networks

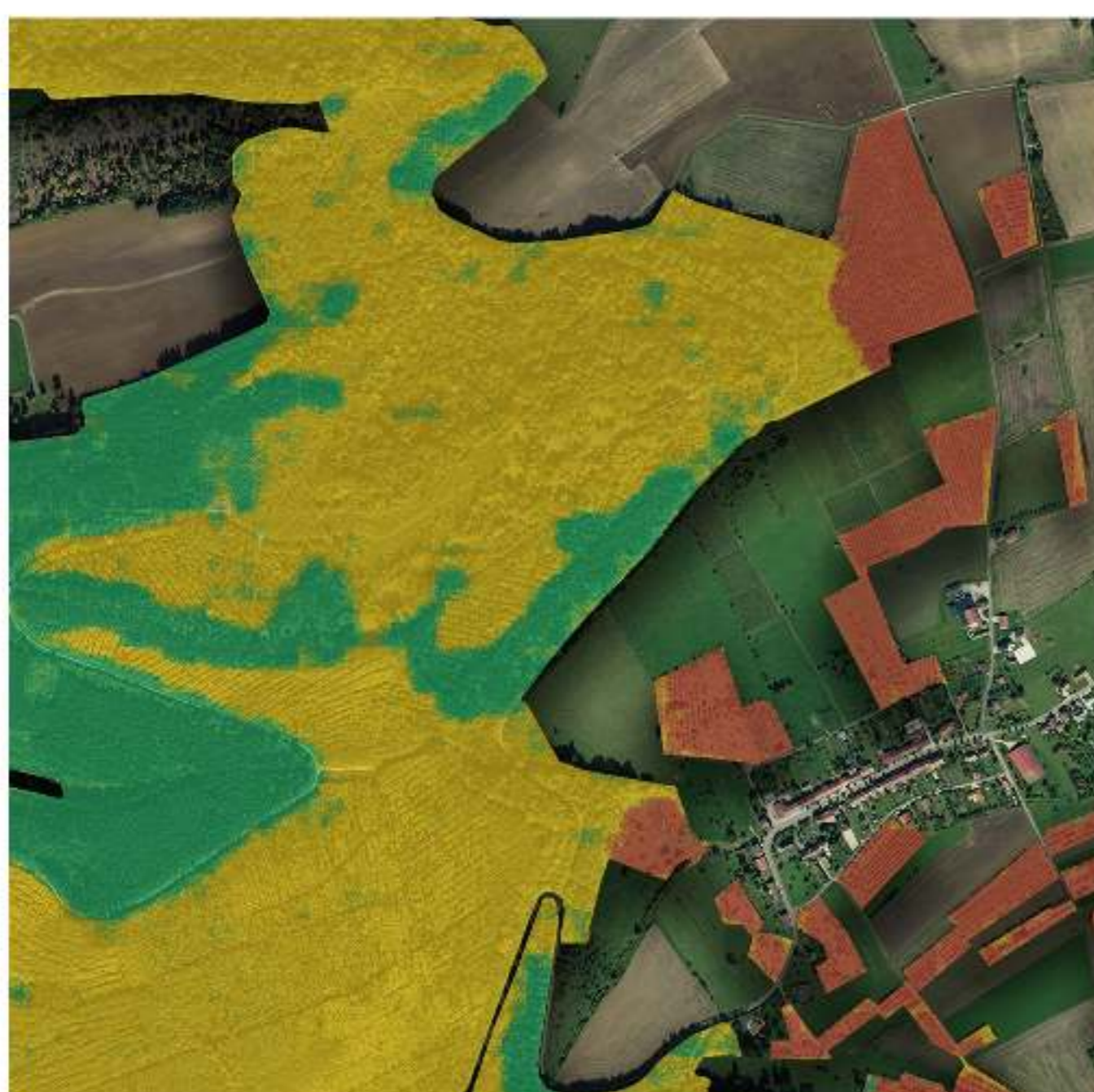


The encoder gathers features from the input image.

The decoders uses the feature map made by the encoder to perform the classification

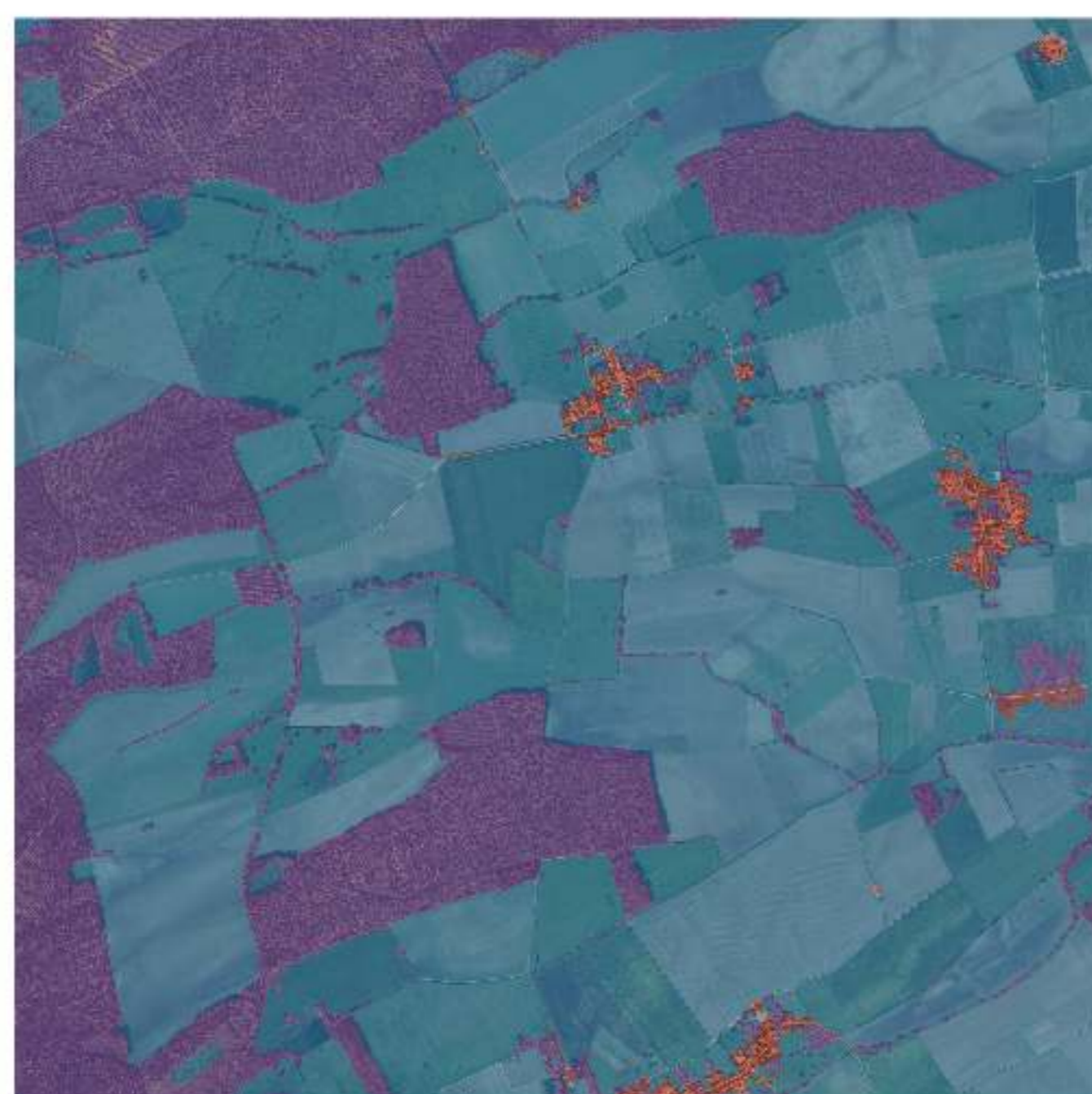
## Initial Results

Forest types classification



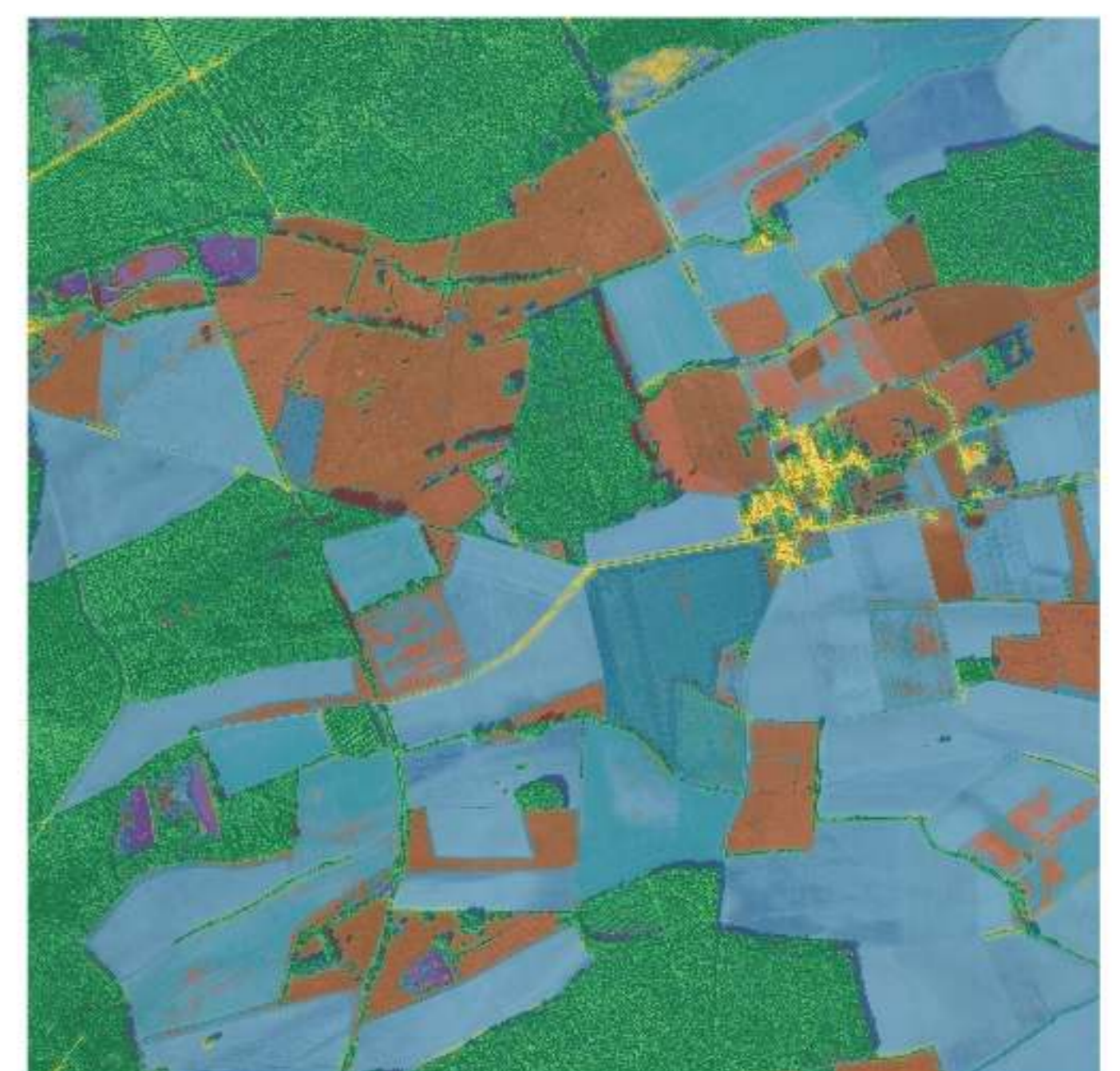
Broad-leaves Trees, Coniferous Trees, Orchards

3-class segmentation



Fields/Meadows, Trees, Urban Areas

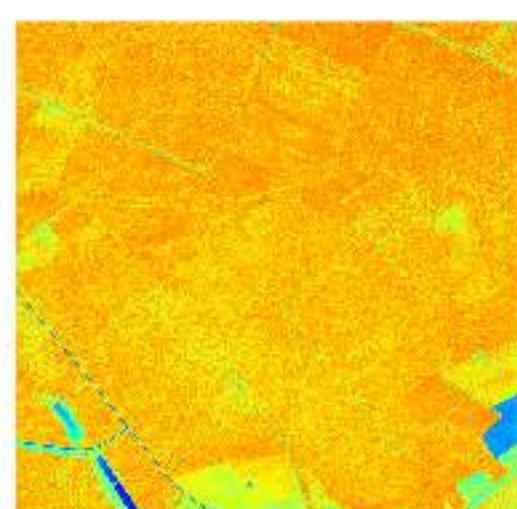
5-class segmentation



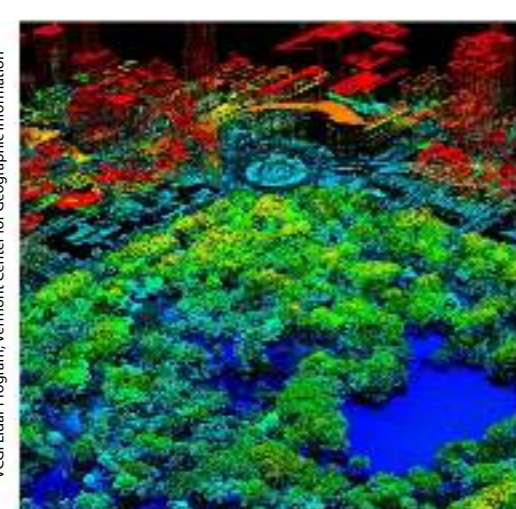
Forest, Meadows, Fields, Urban Areas, Water

## Going Further...

New input layers

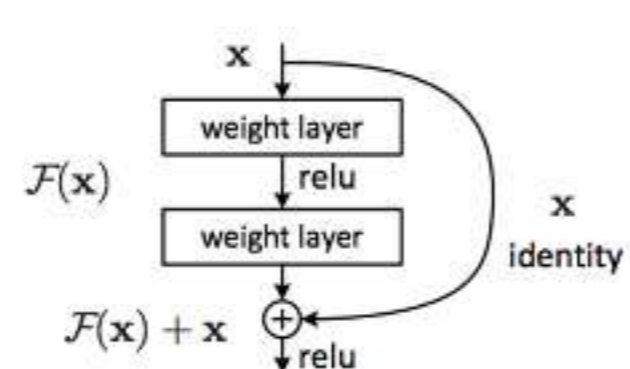


NDVI maps

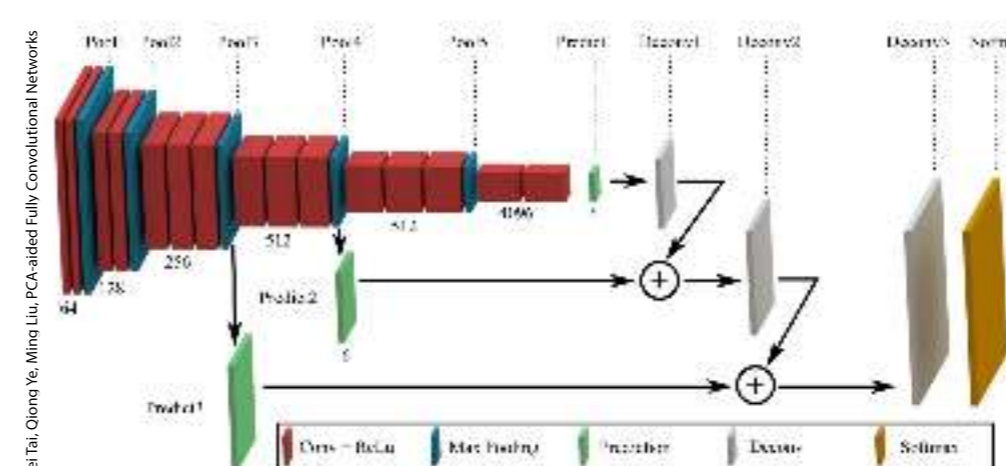


Laser Imagery

## Sharper Auto-Encoder



Residual Networks for the encoder part to enhance the network detection capabilities



FCN for the decoder part to perform better pixel wise classification

## Partners

