Enhanced Sentinel 2 Agriculture Challenge

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INTRODUCTION

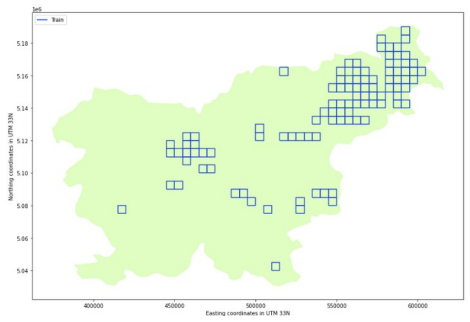
- Satellite images provide accessible, accurate and reliable agricultural data
- Input: Sentinel-2 time-series at 10 metres spatial resolution
- Task: Estimate a cultivated land binary map at 2.5 metres spatial resolution

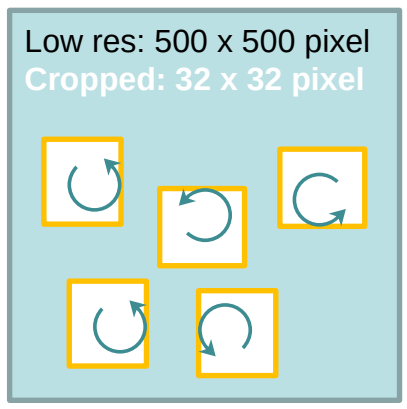
RGB Satellite image

High resolution map

DATA

- 100 locations in Slovenia
- Time period: March to September 2019
- 8 time frames per location used
- Cropped and augmented small images
- Remove cloudy scenes





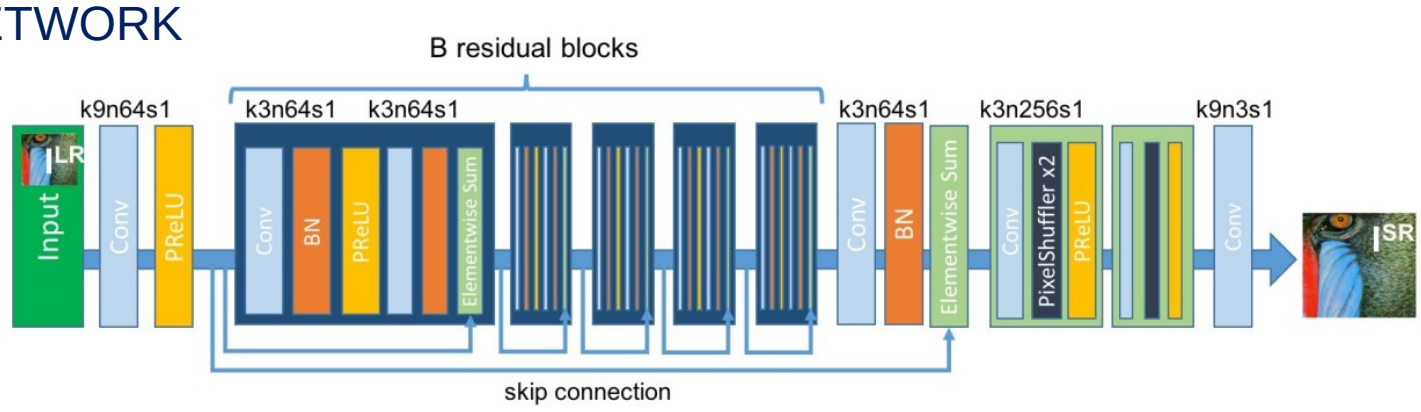
10 spectral bands: visual and infrared

SUPER RESOLUTION NETWORK

- Weighted BCE loss
- Learning rate: 10-4
- Batch size: 12

- 125 channels
- 49 residual blocks

- 100 epochs on NVIDIA A100: 90 hours

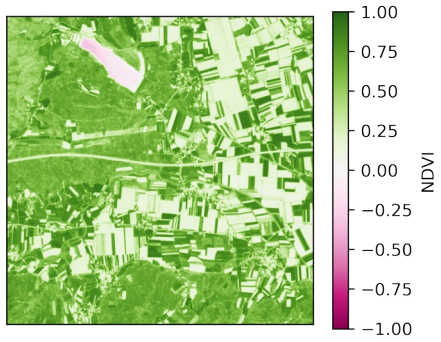


https://github.com/sgrvinod/a-PyTorch-Tutorial-to-Super-Resolution

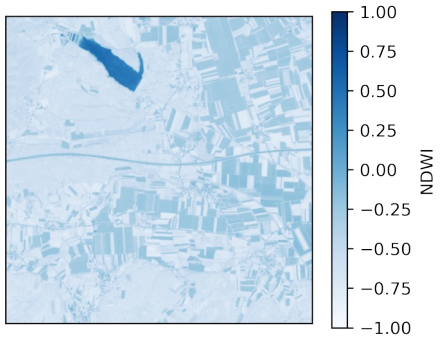
Ledig et al, arxiv 1609.04802

ADDITIONAL INPUT FEATURES

Vegetation index



Water index



EVALUATION

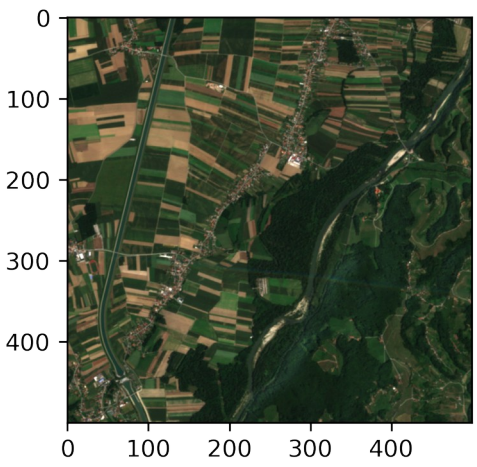
- Matthews Correlation Coefficient
- Weighted pixelwise for emphasis on small structures

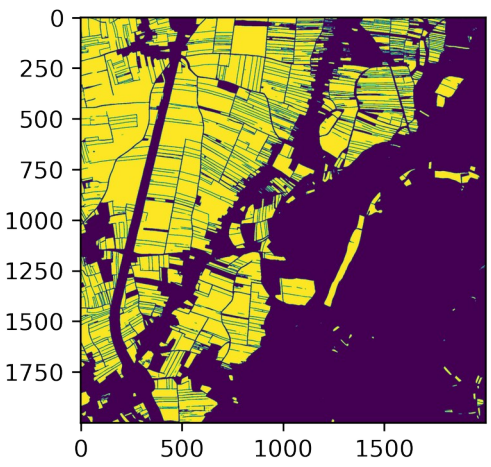
$$MCC = \frac{TP \times TN - FP \times FN}{\sqrt{(TP + FP)(TP + FN)(TN + FP)(TN + FN)}}$$

TEST SET PREDICTIONS

- 20 anonymized locations in Slovenia
- Final score: MCC = 0.832
- Place 3 out of 17 teams

- Ideas for improvement: Generative Network
- Treat the time dimension explicitly





https://platform.ai4eo.eu/enhanced-sentinel2-agriculture