

Detection of Double-Cropping Systems Using Machine Learning and Sentinel 2 Imagery

– A Case Study of Bačka and Srem Regions, Serbia

Miljana Marković (miljana.markovic@biosense.rs), Predrag Lugonja, Sanja Brdar, Branislav Živaljević and Vladimir Crnojević





Double-cropping



- **Double - cropping** - double use of a single field during one year
- Increasing agriculture production
- **Benefits:**
 - Important factor in food security
 - Environmental benefits
 - Rational use of the soil
 - Better economic results

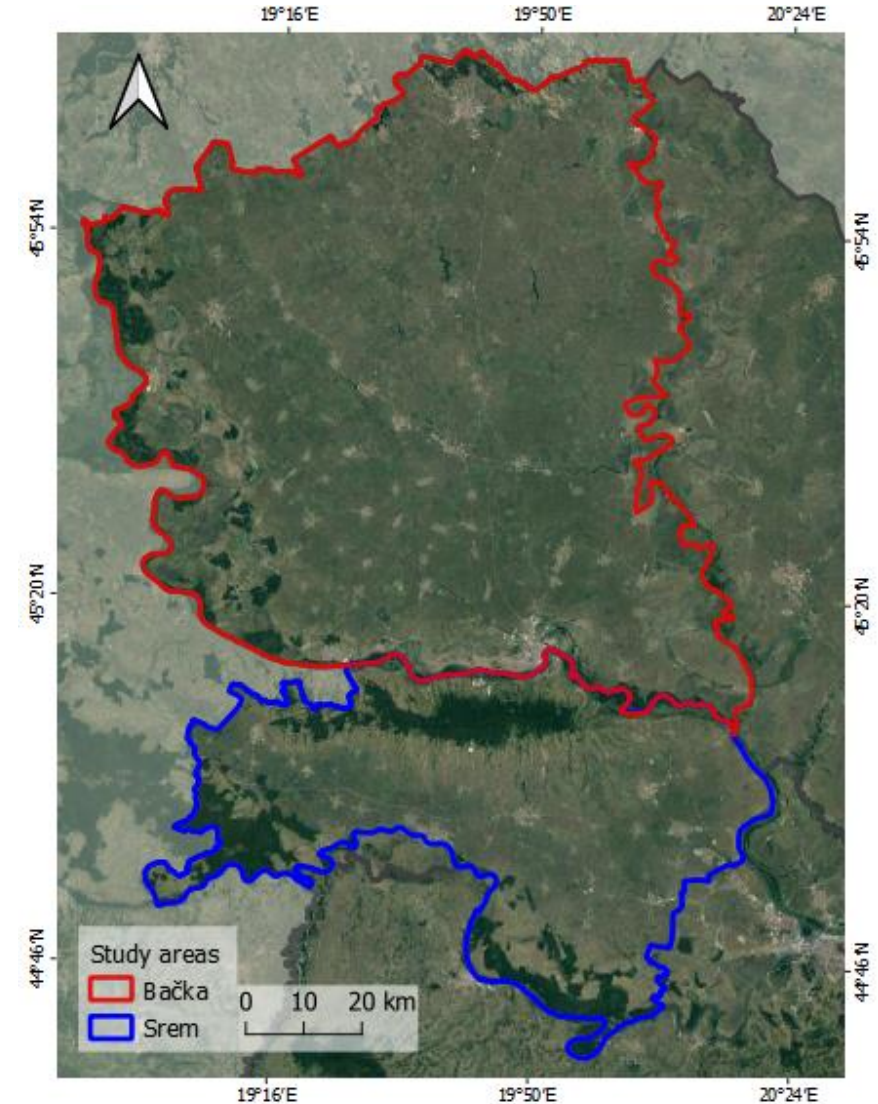




Study area



- Regions:
 - Bačka = 8 848 km²
 - Srem = 3 723 km²
- **Fertile land and widespread agriculture**
- **Dry** summers
- **Low** presence of double-crops
- Need for **irrigation** systems

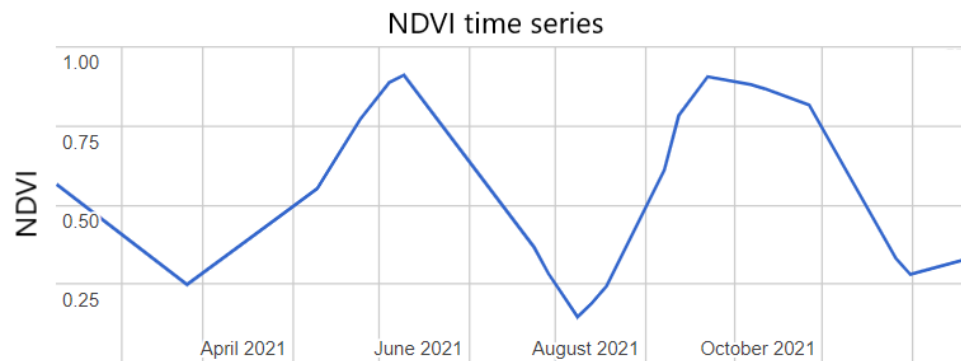




Data

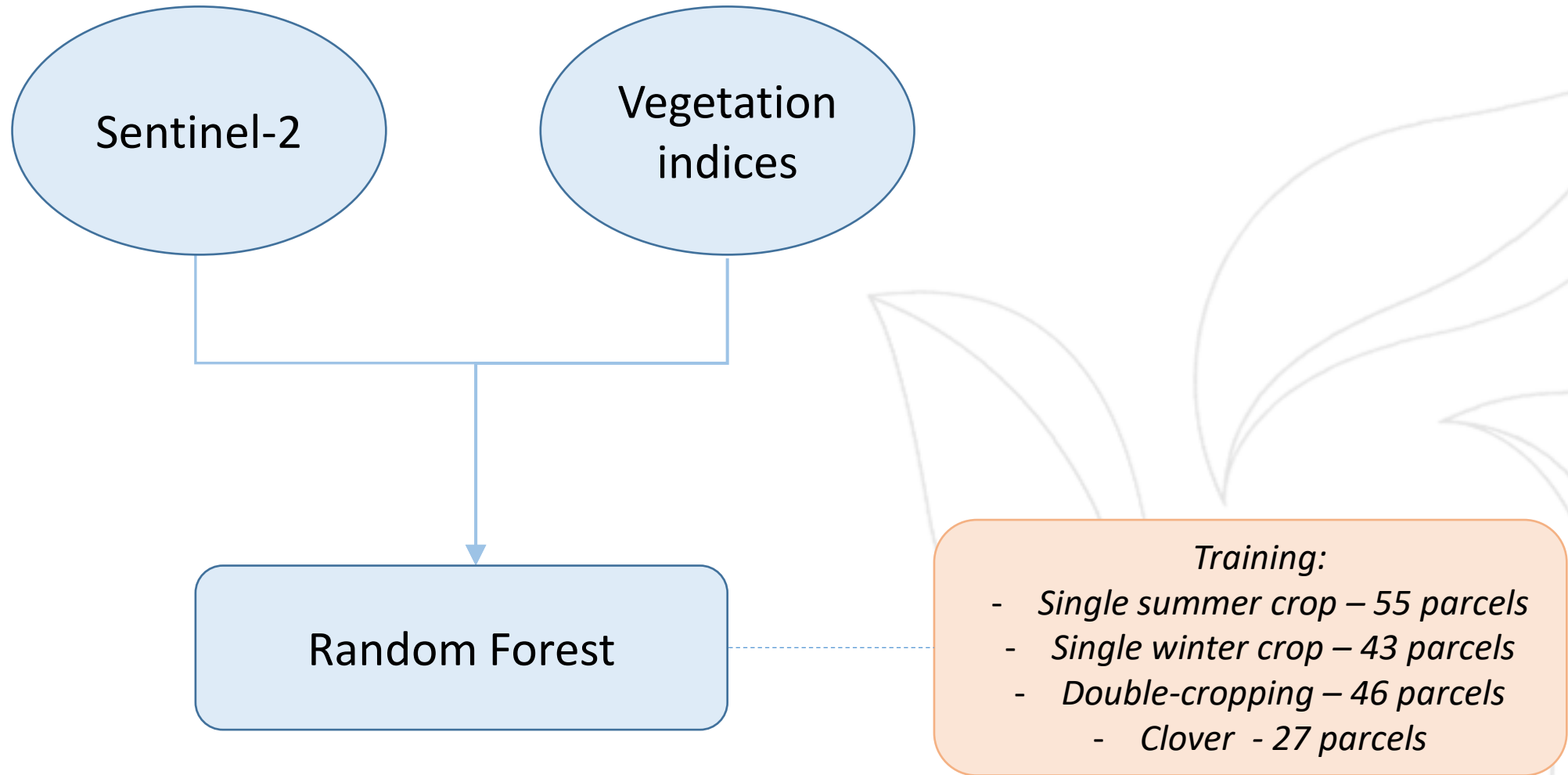


- Ground-truth data:
 - 1st collecting in June
 - 2nd collecting in early September
- Potential double-cropping fields
- **Sentinel-2** time series, 2021
- NDVI time-series
- Thresholding



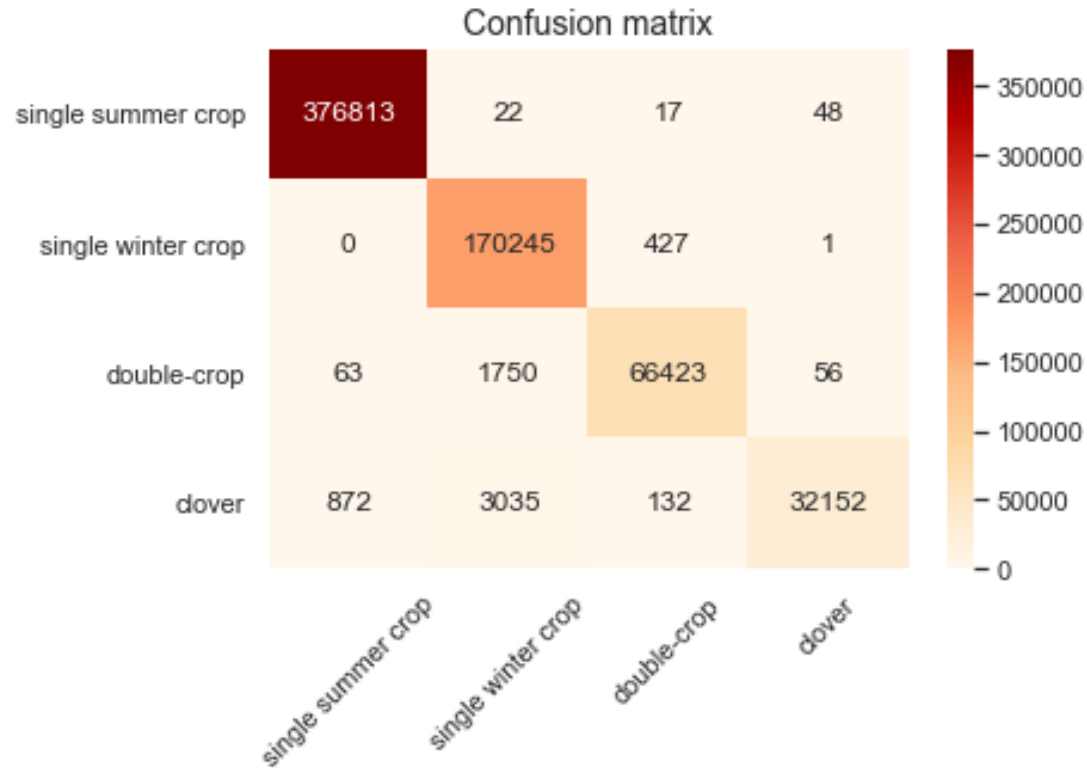


Methodology



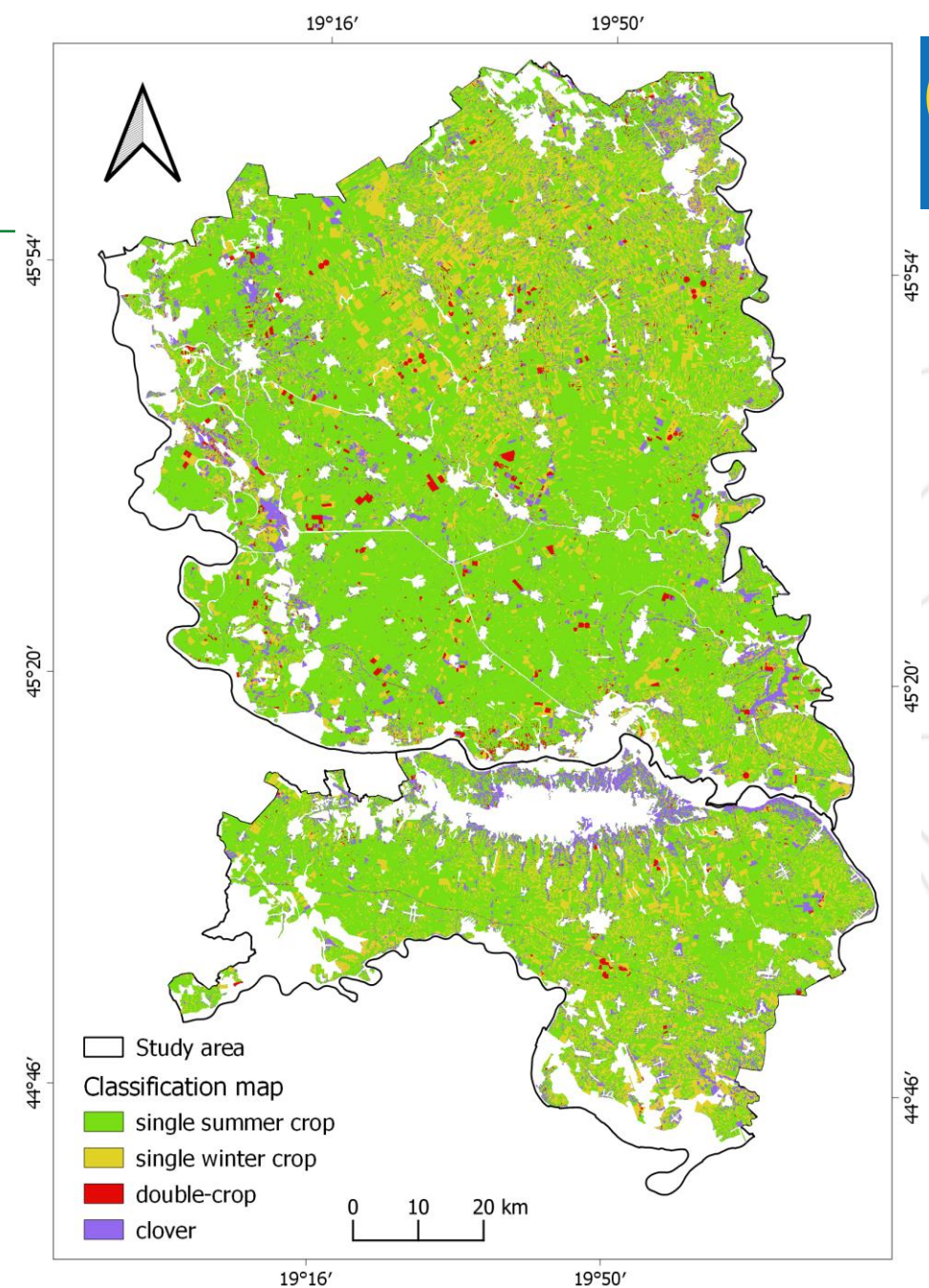


Results



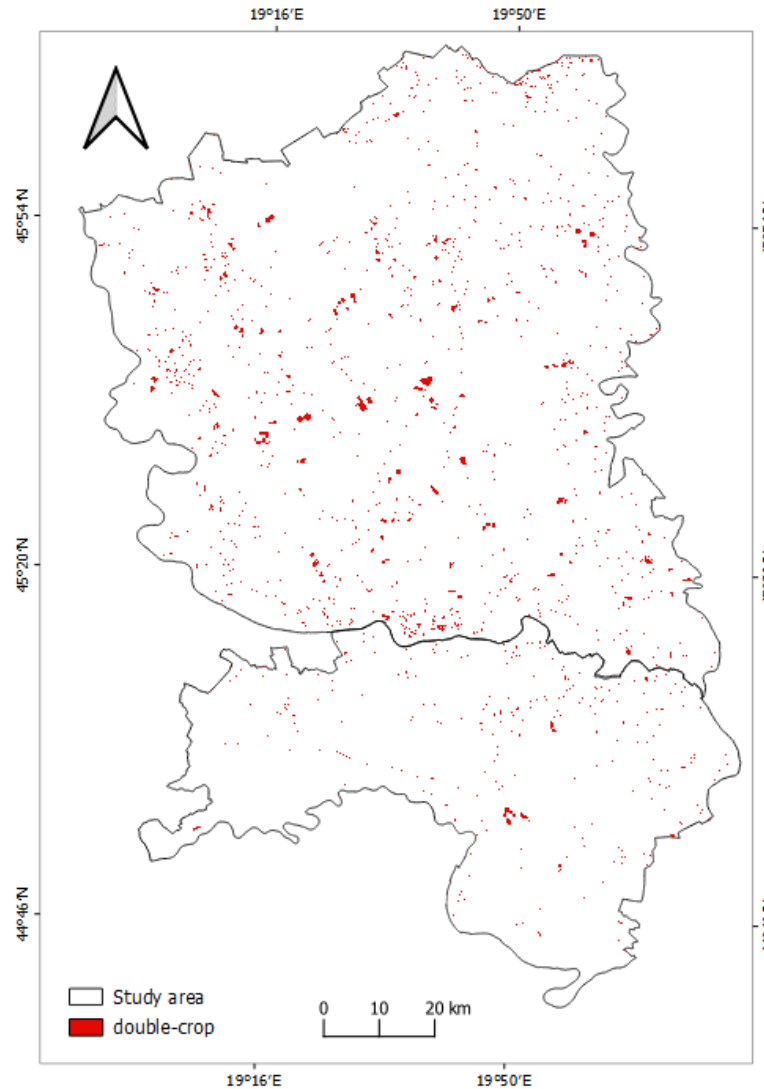
Double-cropping class		
Recall	Precision	F-score
0.97	0.99	0.98

Overall accuracy = 99%





Results & Conclusions



Agricultural practice	[km ²]
Single summer crop	7033.18
Single winter crop	1971.13
Double-crop	170.98
Clover	952.41

- **< 2% of arable land covered by double-crop**
- Suitable approach for detecting double-cropping systems





Future work



- Transferability
- Increase ground - truth data
- Expand area
- Detect crop types of double-cropping
- Crop – rotations



Thank you!

Questions?



Miljana Marković (miljana.markovic@biosense.rs), Predrag Lugonja, Sanja Brdar, Branislav
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