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BioSense INSTITUTE

MAPPING SUNFLOWER AREAS USING HIGH RESOLUTION SENTINEL-2 IMAGES

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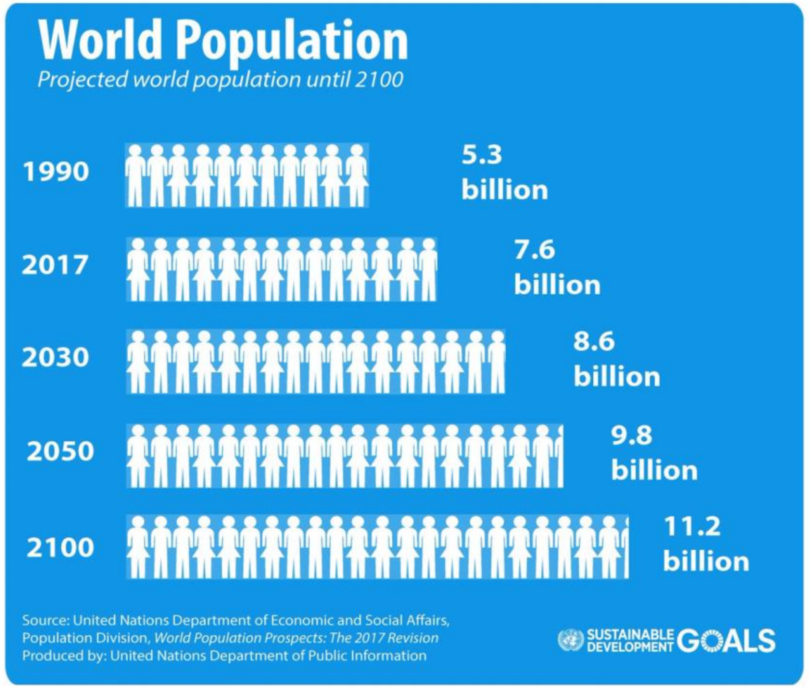
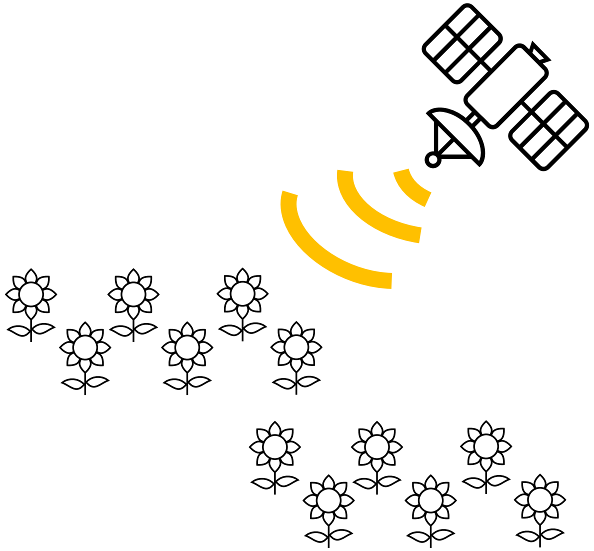
AIM

Detect and map parcels on which sunflower is grown, using satellite remote sensing data and machine learning.





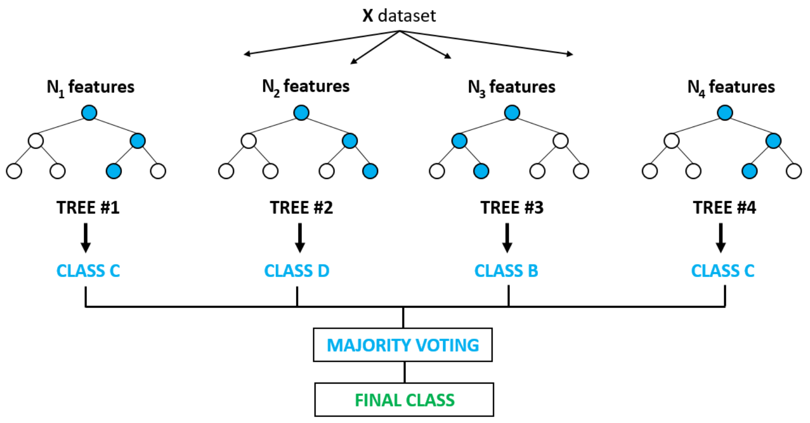
Images obtained from: https://pbs.twimg.com/media/DC2sHHSWsAAHTC9.jpg
https://www.uschamberfoundation.org/sites/default/files/WorldMapGrains.jpg

INTRODUCTION

According to the United Nations' report from 2019, world population will increase from the current 7.7 billion to 9.7 billion by 2050. Hence, global demand for food will continue to increase and threaten food security. A way to ensure and increase sunflower production, likewise for other crops, is to either develop new, high yielding cultivars or bring more area under cultivation. Given that there is a lack of statistical databases and information, at both local and national scales, regularly updated agricultural maps with the identified crop parcels could be of the greatest importance for the national statistics.

METHODOLOGY and TEST SITE

Experiment covered territory of Vojvodina province in Serbia (ca. 21.000 km^2) and three growing seasons (2017, 2018 and 2019). Total of 42 Sentinel-2 images with minimum cloud coverage were analyzed and they covered period from beginning of April to end of August in each season. Ground truth data was collected during field surveys and covered **24000 ha**, **17000 ha** and **8500 ha**, respectively for **2017**, **2018** and **2019**. Labels collected from field surveys together with satellite images served as an input dataset for training a Random Forest machine learning algorithm. Algorithm was created in **Python** programming language, with 100 decision trees, and 10-fold cross validation was used to evaluate the performance of models.



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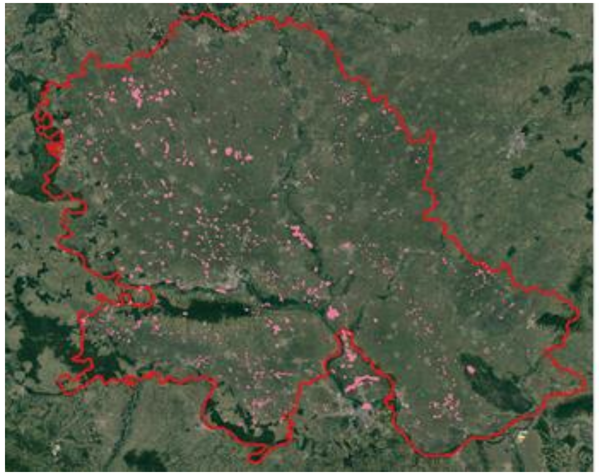

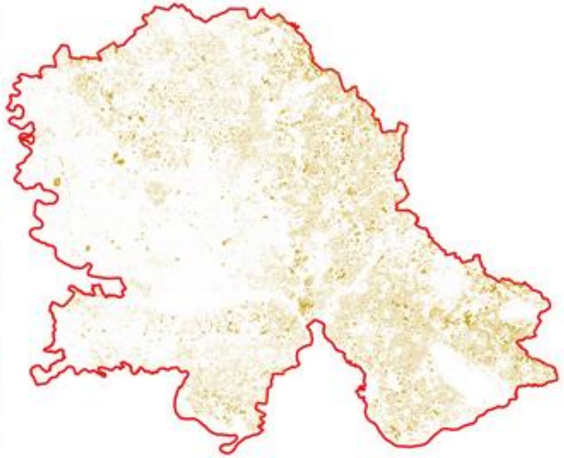

RESULTS and CONCLUSION

The overall performance of the model was **88%**, **85%** and **86%** for 2017, 2018 and 2019, respectively, meaning that the model can detect and map sunflower parcels with high certainty. Leading regions in sunflower production are regions of **Banat** and **north Bačka**, as can be seen on the right image of Vojvodina province for 2019 season. Sentinel-2 proved to have a great potential for sunflower mapping and this methodology could be suggested as promising tool for further crop identification.

See you at the poster session!

Get in touch with corresponding author and explore BioSense Institute's web page

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