

UAV imagery based tree species classification in the Marburg OpenForest

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Abstract

The monitoring of forests environments is of crucial importance since they serve as natural habitats and constitute a main source of biological diversity. Yet, it is very costly and labor intensive to monitor forests by traditional means. Recently, there have been several attempts to use UAV-borne imagery in forest monitoring since these images can be obtained at low cost and can come with both, high spatial and temporal resolution which enable scientists and practitioners to comprehensively monitor forest environments. Tree species identification is primary interest, since the identification of species allows to draw conclusions about the structure and biodiversity in given areas of a forest. When using simple RGB images, species classification still remains a challenge. In this paper we present our results of an experiment exploring the influence of spatial resolution of RGB imagery, artificially derived vegetation indices as well as seasonal parameters on the accuracy of tree species classification within the Marburg OpenForest. We used a resolution of 5 cm, 10 cm, 15 cm, and 25 cm in a forwar-feature-selection based on the RandomForest classification algorithm. Additionally we tested the obtained accuracy when only mono-temporal or multi-temporal variables are included as well as both types of variables. Our results show that ...

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1 Introduction

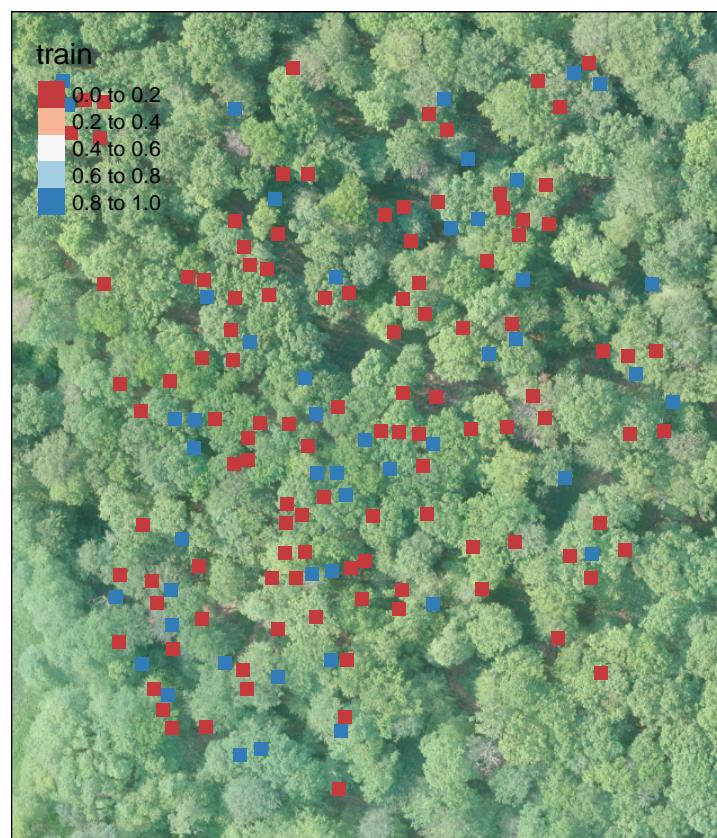
2 Data and Method

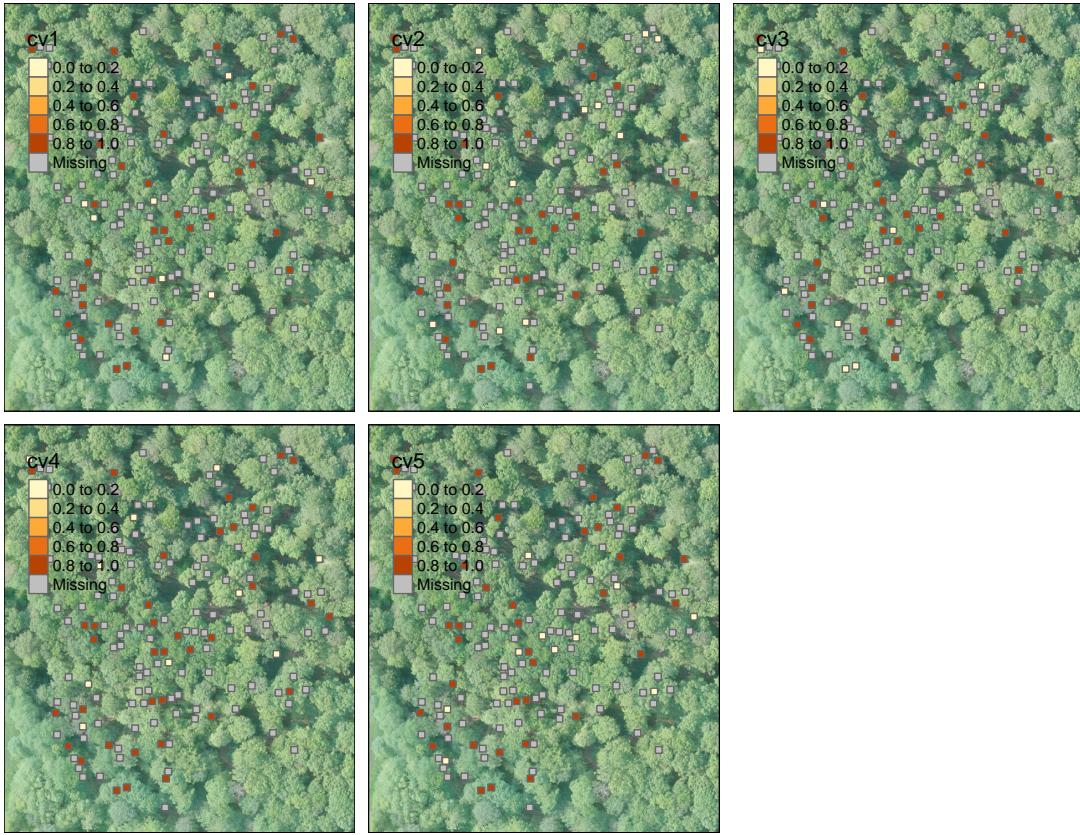
The UAV imageries were obtained through the use of a GoPro x.x and an overpass over the region in approximatley 40 meters height. Orthorectified photos were created by the use of the AgiSoft OpenSource Software. In total we worked on 6 images which were obtained between the end of April to the end of June. In the mitlatitudes of central Europe these are the months of vegetational peak of mixed forests. We calculated a selection of RGB-based vegetational indices for each of the images as well as seasonal statistics which describe the development of these indices in the course of the vegetation period.

Table 1: Dates of the UAV overpasses.

Dates
2019-04-29
2019-05-03
2019-05-10
2019-05-16
2019-06-05
2019-06-20

```
## OGR data source with driver: ESRI Shapefile
## Source: "/mnt/SSD/phenology/data/trees_buffer.shp", layer: "trees_buffer"
## with 161 features
## It has 13 fields
```





3 Results

4 Sources

Example citation (Ulsig et al., 2017).

Ulsig, L., Nichol, C.J., Huemmrich, K.F., Landis, D.R., Middleton, E.M., Lyapustin, A.I., Mammarella, I., Levula, J., Porcar-Castell, A., 2017. Detecting inter-annual variations in the phenology of evergreen conifers using long-term MODIS vegetation index time series. *Remote Sensing* 9. <https://doi.org/10.3390/rs9010049>