

## Proposal for Semester Project

Patterns & Trends in Environmental Data / Computational Movement Analysis Geo 880 FS2021

Gubelmann/ Yves / 14522007  
Wildhaber / Tobias / 15555063

Identifying nests and swallows based on spatiotemporal wild boar data.

Which option do you choose?

- ✓ Option A: Wild boar data
- ✓ Find nesting sites

### Abstract

Due to the ongoing optimization of harvesting methods in agriculture, the prevention of wild boar damages has become increasingly popular in recent years. Understanding the selection of resting places like kettles and wallows build the basis for effective management measures. Based on spatiotemporal data of wild boars we try to determine such resting places and allocate them to surrounding crops.

### Research questions

Using the already known wild boar data from the ZHAW research project "Prevention of Wild Boar Damage in Agriculture" as a basis, we want to answer the following research questions:

How can resting sites be modelled based on spatiotemporal movement data?

Can locations frequently visited by wild boar be determined efficiently and effectively in the provided research data?

Can these regular resting places be clearly defined as kettles or wallows?

### Results/products

We plan on producing maps showing regularly visited areas (by individual animals and collectively) and differentiating by wallows and nests. Diagrams and plots will provide additional context in terms of land coverage or vegetation. The finished documentation will be handed in as Rmarkdown, maps are therefore planned to be interactive.

### Data

We will mainly use data that we have already used in the exercises. The basis is the wild boar movement dataset and its metadata. In addition, we will also use the raster and vector data provided on the environment (field and vegetation type). Additional data on land coverage may be required (e.g. area statistics, vegetation height), which would be obtained from swisstopo.

### Analytical concepts

To gain more meaningful movement data, we will start with segmentation. The segmentation process will be based on predefined movement properties (e.g. speed, step length) which need to be readjusted multiple times and reviewed in a critical manner. The resulting trajectories will then be annotated with a status ("resting", "moving") and joined with land use type to provide further context. Finally, for each resting trajectory a convex hull will be calculated to visualize the results.

### R concepts, functions, packages

We will rely on established and widely used packages, namely tidyverse, lubridate, TERRA and tmap. Tidyverse will be used for maintaining our data clean and tidy data wrangling and visualization of simple plots. More sophisticated plots like convex hulls will be done with tmap and TERRA. Lubridate will be mainly used for handling time and date variables, especially its round function.

### Risk analysis

The biggest challenges will be finding clear criteria to define and identify nests and wallows to differentiate between the two of them. Plan B would be not to differentiate them and just identifying resting sites.

### Questions

What are reasonable criteria for segmentation in our movement data?

How can we clearly distinguish between nesting, wallowing and exclude other "stationary" behaviours (e.g. feeding)?