

Bachelor's/Master's thesis at the Chair of Soil Science and Geomorphology

Title: Multivariate Random Forest for Predicting Soil Quality Indicators

Background

Soil quality refers to the soil's ability to sustain plant and animal productivity, maintain or enhance water and air quality, and support human health and habitation. Soil quality is measured using various indicators, including chemical, physical, and biological features, rather than individual indicators. Soil quality indices are a common and simple way to quantify soil quality, enabling a better understanding of soil ecosystems and more efficient management. **Digital Soil Mapping (DSM)** techniques can also be used to produce maps of soil quality. However, two common approaches can be used to create soil quality maps: 1) generating individual maps of soil quality indicators and later aggregating them, or 2) aggregating soil quality indicators and then mapping them. Alternatively, multivariate random forest models can be used to predict soil quality all at once.

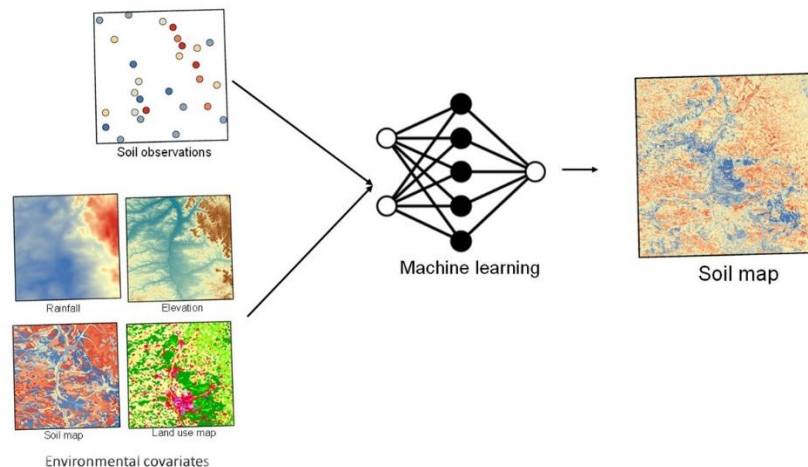


Figure 1. A framework for digital soil mapping

Objectives

- Calculate the soil quality index by assessing the individual soil properties.
- Use a multivariate random forest to predict the spatial distribution of soil quality.
- Evaluate the performance of this approach compared to other machine learning methods, including univariate random forest.

Interest

If you are interested in using innovative methods for soil science, geospatial data analysis, and machine learning, and have programming experience, please contact Dr. Ruhollah Taghizadeh (ruhollah.taghizadeh-mehrjardi@mnf.uni-tuebingen.de). The student will collaborate with **Dr. Ruhollah Taghizadeh** and **Prof. Dr. Thomas Scholten**.

References

- van der Westhuizen, S., Heuvelink, G.B. and Hofmeyr, D.P., 2023. Multivariate random forest for digital soil mapping. *Geoderma*, 431, p.116365.