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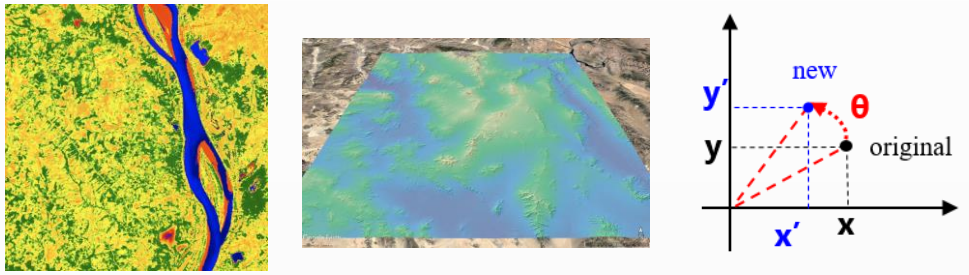
Comparison of Spectral and Geometrical Features in Soil Classification

Soil classification maps are produced using a variety of information, each with its own characteristics. For each soil sample, researchers collect data from various sources and feed that data into a machine learning model.

From a completely different perspective, digital soil mapping relies on two major types of information. The first group tries to answer the 'What is?' question. They provide us with information regarding the ‘identity’ of the sample. Among these are remote sensing images, and spectral indices that can be derived from them, which are actually information about the earth's surface. We call them as spectral features.



Sample of a small set of features including NDVI index, DEM and oblique XY coordinates

There is a second group that attempts to answer the question, ‘Where is?’. In the second group, only the ‘position’ of the sample has been taken into consideration. The data refers to the sample's elevation or XY coordinates in Cartesian or Ellipsoidal coordinate systems. We call them as geometrical features.

Our objective in this study is to examine the impact of each of these groups in the development of digital soil maps.

To accomplish this, We collect spectral features from remote sensing images, geometric characteristics from existing maps, and a few other calculations. Our next step is to consider them as inputs into a machine learning model, and then estimate the importance of each category.

We are looking for a motivated master's student who has experience in remote sensing concepts, digital soil mapping as well as coding skills (Python, MATLAB or Google Earth Engine) for this project. It would be ideal if the final thesis could be written in English as well.

Reference: Møller, A. B., Beucher, A. M., Pouladi, N., & Greve, M. H. (2020). Oblique geographic coordinates as covariates for digital soil mapping. *Soil*, *6*(2), 269-289.

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