OpenSpat Pattern Recognition Exercices

Predicting structures

Yves Brostaux

June 2017

Exercice 2.1 - Soils of europe

Origin of the data

See exercice 1.1

Data description

Data are available for the following physical properties:

- Clay content (%) in topsoil (0-20cm)
- Silt content (%) in topsoil
- Sand content (%) in topsoil
- Coarse fragements (%) content in topsoil
- Bulk density derived from soil texture datasets (obtained from the packing density and themapped clay content following the equation of Jones et al. 2003)
- USDA soil textural classes derived from clay, silt and sand maps
- Available Water Capacity (AWC) for the topsoil fine earth fraction

Note that these data are based on the LUCAS topsoil data for ca 20,000 samples across EU.

Resolution: 500m

Questions

1. USDA soil textural classes are derived from the textural quantitative informations of the soils. Find the best way to assign a soil sample to his USDA soil textural classes knowing his textural informations
   - by emphazing on the prediction performance
   - by emphazing on the description of the classification process

Exercice 2.2 - Aerial image interpretation

Origin of the data

See exercice 1.2

Moreover, you have access to a shapefile (training.shp) delimiting zones of known soil occupation : forests (1, FOR), cultivated fields (2, CCU) and bare soil (3, SN). The area of those zones vary greatly between the 3 classes.

Questions

1. Propose a classifier which will allocate the pixels of the aerial photography to one of the 3 soil occupations.
2. Interpret the main factors driving this classification for each class.

Exercice 2.3 - Fagus sylvatica suitability map

Origin of the data

The European Forest Data Center (EFDAC) release distribution maps for the most important tree species of Europe (Website). We downloaded the map for the Fagus sylvatica species (Fagus-sylvatica_rpp.tif), as one of the most studied species for the impact of the global climate change.

Details on the construction of those maps can be found here. Data is recorded as the relative presence of the species on a 1 km grid size (value between 0 and 1).

Questions

Based on avalaible information about

- climate (WorlClim data, see course notes),
- soils (see exercice 1.1 and 1.2),
- and eventually other informations
  - elevation (NASA Shuttle Radar Topographic Mission (SRTM))
  - forest cover (EFDAC),

establish a suitability map (potential occupation without any human perturbation) of the fagus sylvatica tree species on the western european region defined during the course.